CW SAMPLE COPY
MI48103UIVYNUIVYM FCNB FC
UNIVERSITY MICROFILMS
SERIAL PUBLICATIONS
300 N ZEEB RD
ANN ARBOR MI 48103

Survey Finds Users Slow To Adopt DDP

Many users of large IBM computers think and talk a lot about distributed processing, but relatively few have done much about it, a *Computerworld* survey of 20 370/168 and 370/158 users has found.

Seventy percent of the users surveyed reported that they had considered implementing a distributed processing system, but only nine of the respondents said they had already installed such a network or planned to do so soon.

And of the nine systems labeled as distributed, three proved to be centralized data bases that had been divided among several sites. So users of truly distributed processing systems accounted for only six respondents, or 30% of the survey population.

In other findings, the survey revealed that only 20% of the users contacted plan to split their data bases among several remote locations, while 35% definitely had decided against that option. The remaining 45% either declined to discuss the specifics of their distributed processing plans or confessed they were not privy to their companies' long-term DP policy.

This is the second article in a three-part survey of users' attitudes toward alternative CPUs, distributed processing and IBM's Systems Network Architecture (SNA) by Jeffry Beeler, Ronald A. Frank and Molly Upton.

The survey also found that exactly half the users intend to install a terminal-based system, if they have not done so already, and that 35% plan to acquire at least one minicomputer-based system.

(Continued on Page 4)

NEWSPAPER

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper Second-class postage paid at Boston, Mass., and additional mailing offices © 1977 by Computerworld, Inc.

Vol. XI, No. 39 September 26, 1977 75¢ a copy;$18/year

Burroughs Unit Speeds Running Fortran Code

By Frank Vaughan
CW Staff

DETROIT — The Burroughs Corp. here has introduced an Attached Fortran Processor (AFP) that can reportedly sustain a computing rate of up to 1.5 million floating point operations per second.

The AFP can be installed on any Burroughs B6700, B6800, B7700 or B7800 general-purpose systems, according to a spokesman, who noted that the AFP can execute Fortran programs at up to 10 times the speed of the B6807 large-scale system.

The AFP serves as a mathematical program-oriented subsystem to the companion Burroughs system, which acts as the AFP's system manager.

Operating under a new release of the Master Control Program (MCP), the system manager provides a control environment for the attached processor and at the same time performs the user's business-related DP tasks, which may include on-line and real-time operations.

The spokesman estimated that between 10% and 15% of the capacity of a 6000 series system is utilized managing the AFP, leaving the remaining 85% to 90% of system capability for other work.

The system manager also compiles Fortran application programs, schedules jobs for the AFP to run, provides data I/O, controls peripherals and permanent storage devices, monitors errors and performs on-line diagnostics.

The Fortran processor itself operates at 12.5MHz, and the spokesman noted that the system's processing speed can be attributed not only to the speed of the processor but to the AFP's local buffering. It also does some look-ahead before the actual operation of an

(Continued on Page 7)

Annual Survey Indicates

DP Salaries Up; Increases Slowing

By Ann Dooley
CW Staff

LAKE BLUFF, Ill. — Although the economy was looking brighter, DP salaries rose more slowly this year than they did in 1975-1976, according to the annual *Hansen's Weber Salary Survey*.

Salaries grew at 5.1% this year compared with a 5.7% rate last year, the report said.

Top DP managers fared the best in salary hikes, experiencing an 11.2% increase amounting to an average salary of $36,036 nationally.

The highest paid person in that job category earned $86,684 this year, whereas five years ago the top salary was $46,176.

The salary statistics for the Hansen survey cover June 1976 to June 1977 and include 1,157 DP installations, 75 different cities and salary rates of 88,166 employees.

Nationally, systems analysts received a 6.2% increase based on six levels within the systems analyst job function as defined by the Hansen survey. The levels include manager, lead systems analyst, senior systems analyst and levels A, B and C.

The senior level systems analyst earned a 6% increase for an average yearly salary of $20,384. The entry level position (C) had a 4.5% increase, earning an average salary of $12,584 annually.

The senior applications programmer earned a 5% increase, receiving an average salary of $17,524 nationally, while the entry level position in that same function stayed at the same level as last year. The entry level salary is $11,076 nationally, which was an average increase of only two dollars a year, according to Sandra Green, compensation survey coordinator.

The average nationwide increase for all six levels of applications programmer amounted to 4.6%, according to the survey.

Computer operators on the senior

(Continued on Page 2)

Kreps Considering IBMer For Post in Revamped OTP

By Edith Holmes
CW Staff

WASHINGTON, D.C. — Still another attorney with an IBM connection is being considered for a top-level position in the Carter Administration.

Anne W. Branscomb, vice-president of Kalba-Bowen Associates — consultants in telecommunications, is one of five candidates for the new position of Assistant Secretary of Commerce for Communication and Information, created out of the President's reorganization of the Office of Telecommunications Policy (OTP). She is also the wife of Dr. Lewis M. Branscomb, vice-president and chief scientist of IBM.

If selected by Commerce Secretary Juanita Kreps to be recommended to the President for the communication and information policy job, Branscomb would join several other key federal government officials who have been linked to the corporation, including Secretary of State Cyrus Vance, Secretary of Housing and Urban Development Patricia Harris, Secretary of Defense Harold Brown and Attorney General Griffin Bell.

Branscomb, who attended George Washington University's law school and was admitted to the bar in 1962, was among five people included in a group interview conducted here re-

(Continued on Page 6)

Jury Verdict Directs IBM To Pay Forro $2.7 Million

By Molly Upton
CW Staff

SAN FRANCISCO — A five-woman, one-man jury has ordered IBM to pay Forro Precision, Inc. $2.7 million in a verdict on Forro's charges that IBM interfered with its components business.

The jury failed to reach a verdict on the antitrust charges pressed by Forro. It did, however, order Forro to pay IBM $260,777 on a counterclaim alleging misappropriation of trade secrets.

Both sides indicated they plan appeals and motions on the findings.

In awarding Forro the $2.7 million, the jury considered seven counts pertaining to how IBM interfered with Forro's business.

The complaint said IBM, in violation of a protective order, made available to Forro customers and to the San Jose, Calif., police information contained in the depositions of Forro employees and Forro documents produced for the IBM vs. Memorex case.

Furthermore, Forro alleged, IBM approached various law enforcement agencies and officials asking them to

(Continued on Page 6)

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
TM reg. U.S. Pat. Off.

EDITORIAL
Editor — E. Drake Lundell Jr.
Deputy Editor — Ronald A. Frank
Managing Editor — Nancy French
Associate Editor — Donald Leavitt
Associate Editor — Esther Surden
Associate Editor — Molly Upton
Assistant Editor — John P. Hebert, Frank Vaughan
Computer Industry Editor — Toni Wiseman
Washington Bureau — Edith Holmes
Staff Writers — Catherine Arnst, Jeffry Beeler
Chief Copy Editor — Cheryl M. Gelb
Copy Editors — Barbara T. VanScoyoc, Susan Gerrard
Photography Editor — Ann Dooley
Editorial Assistant — Denise Petski
Editorial Cartoonist — Jim Orton
Bureaus:
London — Roger Frampton
Munich — Hans-Jurgen Ballnath
Asia — Hidetsuna Sasaki
Contributors:
Education — J. Daniel Couger
Legal — Roy N. Freed
Taylor Reports — Alan Taylor
Human Connection — Jack Stone
SALES
Vice President/ Marketing — Roy Einreinhofer
Advertising Administrator — Terry Williams
Display Advertising — Mary Anne Furlong
Classified Advertising — Frank Collins
Recruitment Advertising — Kathy Steinberg
Sales Promotion Director — Jack Edmonston
Market Research — Kathryn V. Dinneen
CIRCULATION
Vice-President/ Circulation — Margaret Phelan
Circulation Manager — Barbara Jeannetti
Customer Service Rep — Peggy Kelly
Assistant — Maureen Burke
PRODUCTION
Manager — Lee Vidmer
Supervisor — Henry Fling
Assistant Manager — Peter Holm
Typesetting Supervisor — Donna Turnbull

Please address all correspondence to the appropriate department at 797 Washington Street, Newton, Mass. 02160. Phone: (617) 965-5800. Telex: USA-92-2529
OTHER EDITORIAL OFFICES: England: Computerworld Publishing Ltd., 140-146 Camden Street, London NW1 9PF. Phone: (01) 485-2248/9; Telex: 264737. **W. Germany:** Computerworld, c/o Computerwoche GmbH, 8000 Munchen 40, Tristanstrasse 11. Phone: 36-40-36/37. Telex: 5215350. **Asia:** Computerworld, c/o Dempa/Computerworld Company, Dempa Building, 1-11-15, Higashi Gotanda 1-chome, Shinagawa-ku, Tokyo 141. Phone: (03) 445-6101. Telex: J2424461.
Second-class postage paid at Boston, Mass., and additional mailing offices PN127420. Published weekly (except: a single combined issue for the last week in December and the first week in January) by Computerworld, Inc. Copyright 1977 by Computerworld, Inc. All rights reserved. Reproduction of material appearing in *Computerworld* is strictly forbidden without written permission. Send all requests to Walter Boyd.
75 cents a copy: U.S.— $18 a year; Canada and PUAS — $28 a year; Europe and Middle East — $50 a year; all other foreign — $65 a year. Four weeks notice is required for change of address. Please allow six weeks for new subscription service to begin.
Computerworld can be purchased on 35 mm microform through University Microfilm Int., Periodical Entry Dept., 300 Zeeb Rd.; Ann Arbor, Mich. 48106. Phone: (313) 761-4700. *Computerworld* is indexed: write to Circulation Dept. for subscription information.

COMPUTERWORLD, INC.
Board Chairman/ Publisher — Patrick J. McGovern
President — W. Walter Boyd
VP-Marketing — Roy Einreinhofer
VP-Finance — William P. Murphy
VP-Circulation — Margaret Phelan

ABP MCC MEDIA DATA FORM

POSTMASTER: Send Form 3579 (Change of Address) to Computerworld Circulation Dept., 797 Washington St., Newton, MA. 02160. ac

Salary Increases Slowing Down: Survey

(Continued from Page 1)
level had a 7.5% salary increase, earning an average $12,792 nationally. At the entry level, the salary average drops to $8,320 with no percentage increase large enough to be calculated in the survey.

Further Breakdown

In addition to salary breakdown by DP position, the Hansen survey also examines wage increases by size of installation, type of city and industry.

Installation size is based on the monthly rental of equipment hardware. A Size One site spends up to $12,000 a month on rental equipment, Size Two spends $12,000 to $25,000. Size Three spends $25,000 to $50,000, Size Four spends $50,000 to $150,000 and Size Five spends over $150,000 on hardware.

The size of the installation is correlated to a city level which consists of a number of cities with similar characteristics. Of the five city levels used in the survey, Chicago is calculated as the base number and all other cities are compared with it.

For instance, Chicago is rated as a Level Two city based on its cost of living, salary index and numerous other factors. New York is a Level One city, Denver is a Level Three, Jacksonville, Fla., is a Level Four and Des Moines, Iowa is a Level Five city.

Correlating installation size with a Level Two city, a top DP manager there earns $30,056 in a Size One installation, $32,760 in a Size Two, $34,320 in a Size Three, $37,024 in a Size Four and $43,316 in a Size Five installation.

For the top manager, a definite correlation appears between installation size and salary.

In the case of a senior systems analyst, however, installation size doesn't seem to mean as much. The average salary was found to be $19,396 in a Size One installation and a Level Two city, $21,476 for a Size Two installation, $20,800 for a Size Three, $21,268 for Size Four and $20,280 for a Size Five installation.

The senior applications programmer in a Size One installation in a Level Two city received $16,588 yearly, $18,824 in a Size Two installation, $17,836 in a Size Three, $18,616 in a Size Four and $18,616 in a Size-Five installation.

A senior computer operator for a Level Two city and a Size One installation received $11,544 yearly, $12,948 in a Size Two, $12,688 in a Size Three, $13,104 in a Size Four and $13,988 in a Size Five installation, according to the survey.

Installation Size

The figures indicate that salary was correlated to the installation size for the top manager and for the computer operator, although less significantly. For the programmers and systems analysts, installation size was not important to their wages.

The size of the installation might prove important in a top DP management position, because job competition is usually from a nationwide market. While this is not true of computer operators who are drawn from a local market, the size of the installation could prove important because operators must have more knowledge and sophistication to work in a correspondingly more sophisticated DP environment and their salaries would rise with their skills, the survey said.

Analysts and programmers are also taken from a local market, but their job function and level of sophistication might be incidental to the size of the installation, according to Green.

The survey also covers 10 types of industries including manufacturing, transportation, communication, utilities, wholesale trade, retail trade, finance, insurance and real estate, services and government.

Looking at the manufacturing figures from a Level Two city, the top DP manager in manufacturing earned $38,012, in finance the manager earned a yearly salary of $33,228 and in government he earned $42,068.

The senior systems analyst earned an average of $21,892 yearly in manufacturing, a salary of $19,708 in finance and $22,568 in a government DP installation.

The senior applications programmer who is in manufacturing in a Level Two city earned $18,408 on a yearly average, $17,056 in finance and $20,280 in government.

The senior manufacturing computer operator earned $13,156 yearly, in finance $12,532 and in government $15,756.

The survey indicated that some cities experienced higher-than-average increases such as Dallas which was up 9.4%, Houston up 9.9%, Denver up 7.4% and St. Louis up 7.6%.

Large northern cities such as Chicago and New York experienced lower wage increases than the national average, the survey determined.

Possible explanations for the low gain could be that the DP employees in large installations found in those cities move rapidly through the levels of their job in a large DP installation. They don't stay at one level long enough to gain an increases at that level before moving on to the next, Green hypothesized.

The Hansen survey also indicates that the trend of companies to move to the sunbelt might have created a supply-and-demand problem for those DP people who refused to relocate. Those extra people might have had something to do with bringing the figures down, Green suggested.

But it is too soon to determine accurately the reasons for the low increases in the north, she said.

In addition, the reason for the large increase in salaries might be that the South has never had to pay the premium wages that the Northeast, Midwest and California do. Those areas have a high cost of living and a high level of DP sophistication. Given a few more years, the salary statistics might equalize somewhat, Green predicted.

The 1977 Hansen survey can be purchased for $95 from A.S. Hansen, Inc. at 1080 Green Bay Road, Lake Bluff, Ill. 60044.

On the Inside This Week

NEWS
Distributed DP Seen Efficient Business Tactic 5
French Official Urges DP Education, Control 8
Scandinavians Seek Solutions to Dependency 10
Scheduling System Helps Double Court Docket 12
System Analyzes Students' Journalistic Skills 14
Giros Help Consumers Keep Payment Control 15

EDITORIAL
Editorial: Alternatives Growing 16
Human Connection: Success Stories Rolling In 19
Taylor Report: System Has Proven Its Value 19
CCP Emphasizing Education in Place of Real Ability ..21

SOFTWARE & SERVICES
Fortran IV One Highlight of IBM 34 Enhancements ...23
Data Administrator Duties Differ From DBA's 24
M6800 Cross-Compiler Bows 25
CPEUG To Blend Technical, Managerial Topics 26

COMMUNICATIONS
Protocols Key to Communications Future 31
Canadian Group Introduces Basic Teletypewriter 32
Bank Installing Statewide Net and Diagnostics 34

SYSTEMS & PERIPHERALS
NCR Unwraps Largest Interactive 8000 41
Data Entry Savings Means People Management 42
'Ease of Use' Has Become Latest DP Buzzword 43

MINIWORLD
IBM Enhances System/34 49
Method Promotes Organizational Enrichment 50
Mini-Based Units Read Pages, Documents 52
System Helps Firm Triple Cash Flow Speed 53
Ampex Has PDP Options 54

MICROCOMPUTING
Builder Shares Knowledge, Frustrations 55
Tele Speed Has Serial Printer 56
Unit Programs Eprom Chip 58

COMPUTER INDUSTRY
Bubble Memory Prices to Drop: Study 59
CCIA's Influence Still Growing 59
ADL Sees U.S. Losing Edge in World Market 61
Hewlett Explains Fundamentals of 'HP Way' 62
Data 100 Happy With Move to Expand Abroad 63
1976 Trade Results Mixed for Electronics Products ...64

A CW Special Report on "Stretching the DP Dollar" follows Page 48.

MUSCLE

Sure, MVS gives you more power. But watch out for sorting charley horses!

(SyncSort's preferable to liniment.)

Call (201) 568-9700.

Get into shape with a free sorting survey.

Do you ever get the feeling that the Computer Giant would like to see *everybody* go to MVS?

We do. Particularly when we read ads like "MVS: Real Muscle for Large Systems," which appeared in a recent DP Dialogue. The lead paragraph went like this:

> "Processing a complex job stream makes unique demands on operating system software. And in a communications-oriented environment, the system must be able to handle large volumes of work in an unpredictable mix of batch tasks and terminal transactions."

So far, so good. MVS *is* a powerful tool in multi-programming, and heaven knows we have nothing against it. Some of our best friends use it. (In fact, *more than half* of all MVS users sort with SyncSort.)

But you have to be careful of software programs that don't fit into multi-programming. Otherwise you may end up with a painful charley horse in all that new muscle.

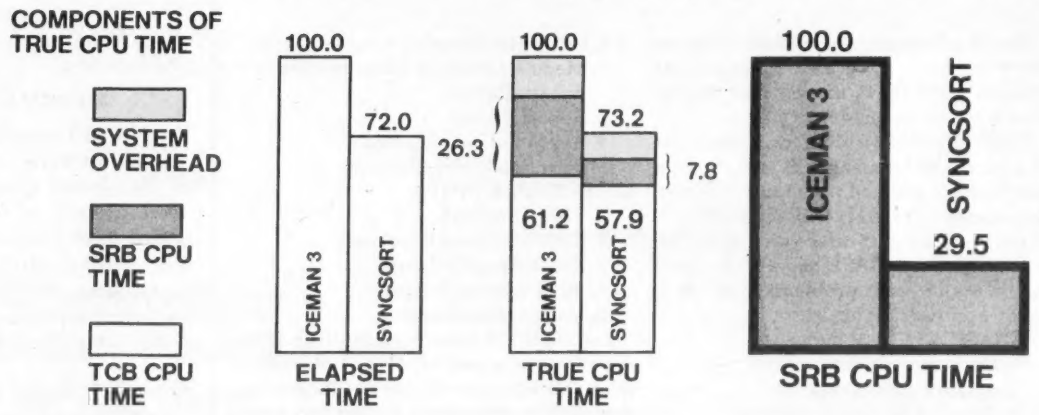
Take sorting operations, for example. They represent a big chunk of those "large volumes of work in an unpredictable mix." In fact, your MVS system may spend 20 or more percent of its time doing *nothing* but sorting.

If you happen to sort with SyncSort III-and-a-half, you're going to have no problems whatever. It's a natural for busy, multi-programming operations. But if you happen to have chosen the Computer Giant's 5740-SM1, Release 3, look out for "locked up" CPU time.

In MVS, there are two components of True CPU Time, apart from systems overhead. They are:

- TCB Time (Task Control Blocks) — which is *interruptible.* If the CPU wants to switch signals and run another job, the message gets through.
- SRB Time (Service Request Blocks) — which is *non-interruptible.* The line is *always* busy. And this directly affects the performance of other jobs in a multi-programming mix.

Take a look at the charts below. They compare SyncSort's overall MVS performance with IBM's 5740-SM1, Release 3. And the two on the right pinpoint the SRB Time differences.



No matter what system you use, SyncSort will give you major savings in computer resources. But it's particularly useful in multi-programming, where that "go to jail" time is reduced by a whopping 70%.

We call it "time off for good sorting behavior."

OVERSEAS REPRESENTATIVES —

Brussels: CAP/GEMINI/CES
Dusseldorf: CAP/GEMINI GmbH
Geneva: CAP/SOGETI
Hague: CAP-GEMINI/PANDATA
Johannesburg: Computing Benefits, Ltd.
London: GEMINI Ltd.
Melbourne: Shell Co. of Australia
Milan: SYNTTAX
Paris: CAP/SOGETI PRODUITS
Stockholm: BRA
Tel Aviv: ADVANCED TECHNOLOGY, Ltd.
Vienna: Ratio

WHITLOW COMPUTER SYSTEMS Inc. 560 Sylvan Ave., Englewood Cliffs, N.J. 07632

Survey Finds Users Not Rushing to Use DDP

(Continued from Page 1)

The most frequently cited reason for not considering distributed processing was satisfaction with existing computer configurations or fear that a hardware change might disrupt long-standing operations. Five respondents used those or similar arguments to justify their preference for centralized data bases.

Thus far, only one of the users interviewed has rejected distributed processing outright after thoroughly evaluating the alternative. Four other users, however, are undecided about the approach, either because they suspect that distributed processing will clash with their existing procedures or because their DP plans are still in the formative stage.

A case in point is the Aluminum Co. of America (Alcoa). There, officials have long considered installing a distributed processing system, but thus far they have remained unconvinced of its value, according to technical services manager R.N. Wehling. If the Pittsburgh firm ever did acquire a distributed processing system, it would probably consist of a central minicomputer linked to 23 remote terminals, he said.

Chase's Schemes

In contrast to Alcoa's cautious and deliberate pace of development, the Chase Manhattan Bank's Trust Department has already implemented two distributed processing schemes. One of these schemes is a communications network based on the department's central 370/168.

The other uses stand-alone minis with little or no communications capability, senior vice-president William Shine said. Those minis include a DEC PDP-11/35, a General Automation, Inc. 3000, a Singer Business Machines Model 10 and several intelligent terminals.

Compared to Chase Manhattan, Blue Cross/Blue Shield's computer center in Richmond, Va., has made less of a commitment thus far to distributed processing, but the health insurance organization has already begun formulating plans to implement a distributed system, according to operations manager Leo Harris.

When fully installed, the distributed processing network will off-load localized data bases and allow remote offices to enter data into Blue Cross/Blue Shield's 370/158 central computer. The proposed network will be based on both terminals and minicomputers, Harris predicted.

Firestone Switching

Firestone Tire & Rubber Co. is also in the process of switching to a distributed processing system, H.W. Guthrie, the firm's operations manager, said. In that system, Data 100 terminals (models yet undecided) will link to a central 370/168 and 370/158 at the company's DP center in Akron, Ohio.

Among its other distributed processing plans, the firm will split its data base and install both a terminal-based and a minicomputer-based system.

Hallmark Cards, Inc. regards distributed processing and a move to IBM's Systems Network Architecture (SNA) as part of the same potential systems upgrade, Ron Schmidt, the firm's senior technical services analyst, explained.

Early next year, the Kansas City company plans to install an IBM 3705 with a 3790 remote terminal system. At first, the firm will test the 3790 alongside its central 370/168s, but if the results prove positive, Hallmark will place additional terminal systems, Schmidt said.

Northwestern Mutual Life Insurance Co. is another of the survey respondents that has already created a distributed processing system. Jeff Dunn, the firm's assistant DP director, said the system consists basically of Texas Instruments DX-20 minicomputer terminals that connect all the company's remote locations to its central 370/168 in Milwaukee.

Separate Data Bases

Prudential Insurance Co. of America maintains several computer sites and has distributed some of its computing power to each of those locations, according to shift supervisor Mike Capo.

Rather than split its data base among several sites, the Roseland, N.J., firm operates a separate data base for each of its computing applications, Capo added.

Sears Roebuck Co. uses distributed processing only on a "very limited" scale at its Philadelphia computing center, data center manager Ronald Leone explained.

In fact, that system is confined to one building, where a series of remote minicomputers links several of the company's administrative departments to a central 370/158. At its Chicago headquarters, however, Sears is further exploring distributed processing techniques in research and development projects, Leone said.

A distributed processing system of sorts also is operating out of Amoco Production Co.'s computing center in Tulsa, Okla., according to operations manager William Caldwell. That system, however, consists primarily of large mainframes — a 370/168 in Tulsa and a 370/145 plus a 370/148 at its Chicago office, he explained.

Others Less Developed

Compared to companies like Amoco, however, many other 370/158 and 370/168 users are much less developed in their distributed processing capability. In Akron, Ohio, for example, Goodyear Tire & Rubber Co. has considered distributing its computing power to various sites, but the company has not yet formally committed itself to that approach, according to John Longstreth, manager of data processing support services.

Ford Motor Co.'s computing center in Dearborn, Mich., is also evaluating the potential of distributed processing, equipment manager Roger Bisschop said.

The Ford DP center, which acts as a service bureau for several departments within the company, has assigned a task force to assess the feasibiity of complementing its existing computer hardware with a second processing center, Bisschop explained.

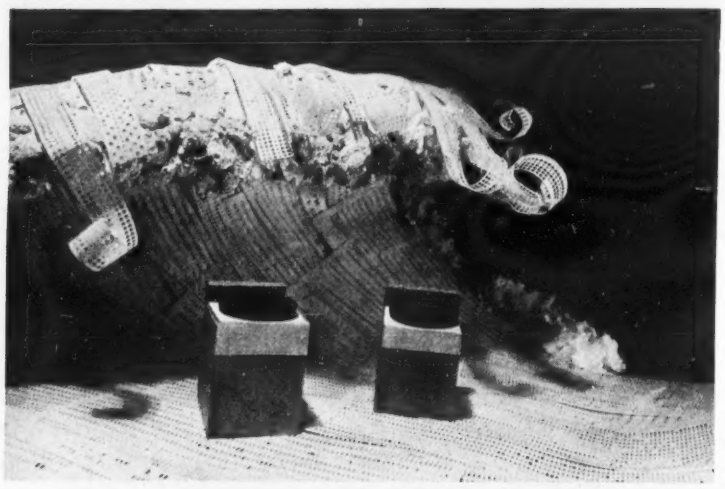
"Before we can think about dual sites, we have to be sure we can continue to provide the current functions to our users," he said. Ford's computing center houses seven IBM mainframes, including a 370/168 and a 370/165, plus two Burroughs CPUs.

Evaluation of distributed processing possibilities likewise continues at Sun Oil Co.'s Information Services Division, but as with Ford, the Tulsa, Okla.-based company has formulated no firm plans, according to Bill Fore, a manager of Sunoco's technical staff group.

Two 370/168s and several 360/30s run under RJE at the company's cen-

(Continued on Page 7)

Are Your DASD's Drowning . . . in a Sea of Data?



DMS/OS the Wave of the Future in Disk Management

For the first time in software history there is now a total disk management system. DMS/OS is the wave of the future in DASD management.

DMS/OS contains all of the ingredients of a successful package. It is extremely easy to load, use and maintain; it is well documented; it is user-proven in all types of environments; it offers strong technical support from DASD experts; it solves many major user problems; and it is easily cost justifiable.

The **BASIC SYSTEM** includes:

1. Management Reports
2. Archival/Retrieval
3. Data Set Retention Control
4. Migration of Sequential GDG's From Disk to Tape
5. PDS Management
6. DSCB Retriever
7. Module Intercept (Source code not available)
8. Report Writer
9. Table Support System
10. Selective Dump/Restore

SELECTABLE UNITS

1. VSAM Support
2. TSO Command Processor
3. DASD Space Billing
4. Mass Storage Support*
5. Volume Configurator

Let DMS/OS save your DASD's from drowning in a sea of data. DMS/OS is available for a free 30-day on site evaluation. Call or write today for our brochure, functional overview or for your on-site evaluation. DMS/OS . . . the wave of the future in total DASD management.

*MSS user group information available

SOFTWARE MODULE MARKETING
THE SUPERMARKET OF SOFTWARE

CROCKER BANK BUILDING/PENTHOUSE • 1007 7th Street • Sacramento, CA 95814 • (916) 441-7234 • Telex SMMSAC 377-314

In Europe • California Module Marketing, Ltd. c/o Country Formations, Ltd. • 27 Kelso Place • London W. 8

Automating another department?

This Datapro seminar can help bring your new users on board quickly.

This non-technical three-day seminar is designed especially to help you introduce the management and staff of new user departments to the concepts of EDP, and show them how to start effectively using your department's resources.

At your place...
Fixed fee presentations in your facility

...or ours
Individual enrollments open for
- New York: October 26-28
- San Francisco: November 2-4
- Washington: Nov. 30-Dec. 2
- Chicago: December 12-14

for
FREE COURSE OUTLINE
and full schedule of EDP seminars, call
800-257-9406

datapro
1805 Underwood Blvd., Delran, NJ 08075
In NJ, call 609-764-0100

'Not a Technical Problem'

Distributed DP Seen Efficient Business Tactic

By Toni Wiseman
CW Staff

Business is most efficiently conducted through decentralization, and distribution of computer resources is not only desirable, but also possible and probably inevitable, according to speakers at the Western Electronic Show and Convention (Wescon 77) here last week.

A session on the meaning and impact of distributed processing began with a formal definition of the term: "Distributed processing is an umbrella term for a variety of processing structures whose common goal is the placement of local computer power at the disposal of every unit of the business for the purpose of enhancing each unit's operations and controlling a timely flow of intelligence among these units."

While advocating the move to decentralization, speakers agreed it is not an easy task to accomplish, particularly since the investment in a centralized facility is usually large. In addition, disturbing the calm of the "old regime" may be disastrous.

Jacob Sternberg of Conversational Systems Corp. pointed out the move to distributed processing is not a technical problem. "Once management decides where computer power assistance is required, the technologist can supply that power in a variety of forms," he said.

Sternberg backed up his optimistic statement with several observations.

First, minis and micros are now highly reliable and the concern technologists once had regarding placing hardware in the boondocks is slowly becoming a moot issue.

Further, the small boxes are as intelligent or as dumb as required and local customization can be easily accomplished through hardware or software.

In addition, hardware interfaces, controllers, peripherals and communications devices all have sufficient intelligence to enable timely hook-ups of plug-to-plug compatible hardware, he stated.

Compatibility Goal

The plug-to-plug compatibility goal for both hardware and software enables capitalizing on the coming technical breakthroughs in mass memories, communications and other peripherals.

Plug-to-plug compatible software can be attained. Sternberg added that while current software costs of over $4.50 per documented instruction are ridiculously high, the cost stems from the complexity of the designs and from excessive documentation requirements.

"Specific software is easier to write and document," Sternberg said. "Interfaces between software modules can be created to replace the overhead burden inherent in the complex and general software currently in use," he said.

Taking a look at the question from management's point of view, Sternberg said it should be reassured by the commitments being made by large manufacturers, led by IBM, and by the fact that "pioneering" is no longer required since a large number of successful implementations already exist.

Patrick LaMalva of Citibank N.A. told the audience he was there to "debunk" a few myths about the firmly entrenched business axiom of "economy of scale."

Citibank, he noted, is opposed to the "conventional wisdoms" and believes in keeping operations on a small scale.

"Our concept of economy of scale in banking says operations should be a small unit — one person if possible — with a personal relationship with the customer," he said.

From a systems standpoint, the fundamental problem is the functional approach to systems development that prevails today, La Malva stated. This stems from the fact that most equipment manufacturers still look at functions individually and not as parts of a system, he added.

The primary example of this philosophy is the large, powerful multiprogramming computer that has been marketed as the answer to today's operating problems, he said.

This approach is machine-efficient and people-inefficient, he said, and in a people-intensive business such as banking, that adds up to substantial inefficiencies of cost.

"Because it is based on the principle of 'economy of scale,' this approach militates against the ability of the manager to solve the small-scale problems," LaMalva charged. "And small-scale local, immediate problems are precisely what the business manager worries most about, and where most of his short-term cost and quality opportunities lie."

Finally, and perhaps most important, "This approach encourages — indeed demands — the optimization of specific functions at the expense of all other functions," LaMalva said.

CW at Wescon

FREE

TP SEMINARS

SHADOW II is now the World's leading TP Monitor for IBM 360/370 users running DOS, DOS/VS, DOS/RS, DOS/MVT, EDOS, VM, MFT, MVT, VS1, VS2 or MVS.

To explain its unique functions and the reasons for its major advantages over other TP Monitors, ALTERGO is running a first series of seminars for both Data Processing Management and Technical Staff involved in selection and use of TP systems.

Each Seminar will run from 9:00 am to 4:30 pm and cover such ground as:

Recent technological advances, management benefits, cost savings, integrated DB/DC systems, major features, and simplicity of conversion to SHADOW II from other TP Monitors.

Please Hurry. Return the coupon right away to reserve your places at the location of your choice.

Shadow II
The World's most advanced TP Monitor
altergo

Altergo Software Inc.
Wellesley Office Park
55 William Street
Wellesley
Massachusetts 02181
Telephone: (617) 237-6132

Please reserve ____ place(s) at the following TP Seminar:
☐ October 26, New York Hilton
☐ November 1, Hyatt Regency, Chicago
☐ November 3, Boston Marriott
☐ I cannot attend a seminar but please send information.

Name _____
Title _____
Organization _____
Address _____
Zip _____ Phone _____
My computer is IBM _____ Op. System _____
Present TP Package _____

Kreps Eyes IBMer for Post in Revamped OTP

(Continued from Page 1)

cently by Kreps and Dr. Sidney Harman, deputy undersecretary of the Commerce Department, sources close to the selection process said.

All those interviewed are attorneys. They include Henry Geller, a Fellow at the Aspen Institute who used to be general counsel of the Federal Communications Commission (FCC); Nick Miller, now an OTP consultant, but formerly counsel for the Senate Commerce Committee; Henry M. (Chip) Sooshan III, presently counsel to the House Communications Subcommittee; and Frank Lloyd, recently an executive director of the Citizens Communications Center and now an OTP consultant, the sources added.

The post of assistant secretary for communication and information was created by the President's Reorganization Plan No. 1, which will go into effect, unless voted down by Congress, in mid-October. That same reorganization plan abolished OTP as a White House office and transferred many of its functions and staff to the Commerce Department.

The new office is a Presidential appointment and as such can only be made by Carter himself, a Commerce spokesman pointed out. The Senate must then confirm the appointment.

Carter, however, will probably rely on Kreps' recommendation, he added.

A government official involved in the assistant Commerce secretary selection process described Branscomb as "an attorney from Armonk and involved in broadcasting matters." Kalba/Bowen Associates is based in Cambridge, Mass.

Branscomb's husband, Lewis, served as head of the National Bureau of Standards in Commerce during the Nixon Administration.

Secretaries Vance, Harris and Brown have all served as directors of IBM's board. Attorney General Bell must disqualify himself from all Justice Department matters concerning IBM because the Atlanta law firm of which he was a partner represented the corporation on various occasions.

Kreps herself was rumored to have been recommended to Carter by IBM for the position of Commerce Secretary when Jane Cahill Pfeiffer, an IBM vice-president, dropped out of the running for that position last January.

ECONOMY and POWER

ADM-3A

- Display: 24 Lines, 1920 characters
- Addressable Cursor
- Keyboard may be cleared remotely
- Ma Bell Compatible

DASHER

- 132 print positions
- 30-60 cps
- 10 Key pad
- 5 x 7 Dot Matrix
- Upper and Lower Case

TERMINAL SYSTEMS INC.
11300 HARTLAND STREET, NORTH HOLLYWOOD, CALIFORNIA 91605
213 · 769-6772 415 · 573-7723 Toll Free outside of California 800 · 423-2449

For further information call John Storm

*on quantity orders

IBM Ordered to Pay Forro

(Continued from Page 1)

conduct an investigation of Forro based on information IBM knew to be false.

In 1973, IBM, "acting together with others, seized [Forro's] business records, including confidential pricing information and blueprints, for the purpose and with the intent of destroying plaintiff's business and impeding and eliminating competition in peripheral devices and computer components . . .," Forro stated.

Between 1972 and 1976, IBM "knowingly made false statements of fact to police" and to the Santa Clara County district attorney "for the purpose of securing criminal indictments against certain of its competitors and to hide and obscure the unlawful relationship between IBM and said authorities," the Forro complaint continued.

Forro also charged IBM with misusing its subpoena power issued in IBM vs. Memorex to "intimidate, threaten and harass key employees of Forro [and] gain unlawful access to secret and proprietary documents and business information of Forro and others."

Forro sought a minimum of $220,000 in direct damages and $14 million in punitive damages for the common law counts. It also asked for $12 million under the antitrust charges.

IBM's counterclaim charged Forro, a maker of disk drive components, with misappropriation of trade secrets. IBM sought $5 million in damages and $20 million in punitive damages.

After assessing the verdict, Forro attorney Joseph M. Alioto said he plans to ask for a retrial on the antitrust grounds and the punitive damage claim. He also plans to ask that the jury's award to IBM be thrown out because "the evidence isn't there" for such a decision.

IBM plans to appeal the decision ordering it to pay Forro $2.7 million. IBM chairman Frank T. Cary said, "We are obviously disappointed that the jury didn't reach a decision on the antitrust charges, since we are confident of our position. It's difficult to understand the award to Forro since the 'interference' was related to a search of Forro's premises by the police with respect to IBM trade secrets. We intend to appeal."

SUPERWYLBUR
SUPERWYLBUR
SUPERWYLBUR
SUPERWYLBUR*

A POWERHOUSE OF PRODUCTIVITY
. . . ON YOUR SYSTEM OR OURS!

SUPERWYLBUR* is the powerful multi-purpose software package that's boosting productivity for data processors nationwide.

This conversational computer system and service, available exclusively from Optimum Systems Incorporated, offers advanced word processing capabilities, an interactive programming language, comprehensive text editing and a remote job entry/retrieval controller. And you can use SUPERWYLBUR on your equipment or as a service through any of our data centers.

Word processing potential is nearly limitless. SUPERWYLBUR aligns, justifies, hyphenates, generates automatic tables of contents, and permanently paginates with headings and footings.

Macro programming capabilities permit automation of virtually any routine activity. Process pre-stored commands with comparisons and branching, and expression evaluation.

Text editing with SUPERWYLBUR is fast and accurate. You can create, modify, and retrieve a wide variety of text, program source code, data, letters, manuals, financial statements, and proposals.

Remote Job Entry using SUPERWYLBUR permits jobs to be submitted to computers' batch streams; lets you check, alter job status, selectively retrieve job output at your terminal and route output to remote sites.

Triple your TSO productivity with SUPERWYLBUR by relieving TSO of its editing load and permitting it to function more efficiently in executing user programs.

Pack more power into your programming and processing! Write today for details about SUPERWYLBUR. We'll send you a brochure that outlines SUPERWYLBUR's extensive capabilities and a current price list. Or send your check for $20 for a complete set of SUPERWYLBUR reference manuals.

SUPERWYLBUR IS IBM MAINFRAME COMPATIBLE AND SUPPORTS O/S, VS1, SVS, and MVS.

OPTIMUM SYSTEMS INCORPORATED
5615 Fishers Lane, Dept. C
Rockville, Maryland 20852
301/468-1000 Ext. 258

*SUPERWYLBUR is a mark of Optimum Systems Incorporated denoting a computer software system proprietary to Optimum Systems Incorporated.

long form W-2?

1978 is upon us . . . and 1978 is the year to print quarterly detail on your W-2 s and to use the new SSA Mag Tape format ...

If your 360/370, Burroughs, Honeywell, or Univac payroll cannot handle four quarters accumulation of FICA, earnings and taxes, you have less than 4 months to solve the problem or, for a quick solution just call Joe Nestor (617) 851-4111, Wang Laboratories, Inc., Lowell, MA 01851.

WANG

In Survey of Large IBM Installations

Users Found Slow to Move to Distributed DP

(Continued from Page 4)
tral computer site in Dallas, but Sunoco is not considering splitting its data base among several locations, Fore said.

The company expects its first terminal-based system, which it admits is still fairly primitive, to continue growing, and Sun is also putting the finishing touches on its own stand-alone minicomputer systems, the technical staff manager added.

In contrast to companies like Sunoco, several 370/158 and 370/168 users contacted during the survey expressed little or no interest in distributed processing. Oscar Mayer Co., for example, has declined even to consider a distributed processing system, Roger Tietz, the firm's computer manager, said.

Oscar Mayer has decided to retain its centralized data base because the Madison, Wis., company believes the relatively small volume of data it processes does not justify the changeover to distributed processing, Tietz explained.

Ashland Oil Co. also has chosen not to consider replacing its centralized data base with a distributed computing system. The Ashland, Ky., firm has concluded that decentralization would hamper its operations, according to Stan Wonn, the company's administrative assistant for computer services and sciences.

Not Much Headway

Nor has distributed processing made much headway at Ralston Purina Co. in St. Louis. Company officials have had little incentive to consider that option, primarily because they have found that their firm's current computing configuration, built around a 370/158 and 370/168, can meet all of Ralston Purina's DP requirements, according to Chuck Childers, general manager of computer services.

The Joseph Schlitz Brewing Co. flirted briefly with the idea of converting to a distributed processing system, but for the most part the company has rejected that approach, according to information processing manager R.L. Babcock.

The Milwaukee-based brewer has concluded that distributed procesing does not fit in with its existing operations or DP applications, Babcock added.

As an alternative to distributed processing, the company "does a lot of remote job entry," he said.

Bureaucratic reasons are primarily responsible for PPG Industries, Inc.'s decision not to consider switching from a centralized to a distributed computing system, according to D.L. Campbell, director of the company's computer center in Pittsburgh.

To make a change as drastic as the creation of a distributed processing system requires a central DP policy-making body, and PPG Industries lacks such a body, Campbell complained. Rather, the responsibility for creating the company's DP policy is divided among the managers of the firm's four corporate divisions.

Monsanto Co. in St. Louis credits its decision not to seriously evaluate distributed procesing to satisfaction with its existing centralized system, explained Frank X. Fallert, manager of performance analysis. That computing system consists basically of two major DP centers, one in the U.S. and the other in Europe.

The firm maintains a 370/158 and 370/165 that connect to interactive and RJE terminals, respectively.

Bud Patterson, a production manager with Union Carbide's Chemical Division in S. Charleston, W. Va., declined to comment on his firm's distributed processing plans. Such considerations are the concern of high management and beyond the scope of his responsibilities, he said.

Unit Processes Fortran Coding

(Continued from Page 1)
instruction, and instruction set is optimized for floating point operations, he added.

Processor memory has 128,000 words of 4K metal-oxide semiconductor (MOS) integrated circuits and is expandable to one million words. Memory cycle speed is 160 nsec.

File memory provides the AFP with 2 million to 16 million words of secondary storage utilizing Burroughs disk files. Average access time is 5 msec and information is transferred at a rate of 600,000 byte/sec, the spokesman said.

AFP Fortran is compatible with Burroughs large systems Fortran and the user can develop and test the syntax of AFP programs interactively on the system manager before executing them on the AFP.

Purchase prices range from $850,000 for a basic AFP subsystem with 128,0000 words of main memory and 2 million words of file memory to $2,640,000 for an AFP with the maximum of one million words of main memory and 16 million words of file memory. Lease rate equivalents range from $22,500 to $67,470 a month. Deliveries are expected to start in the third quarter of 1978, the spokesman said.

IMPROVE COBOL PROGRAM PERFORMANCE. DRAMATICALLY. AUTOMATICALLY. GET THE FACTS:

Now, over 500 MFT, MVT, VS1, SVS and MVS sites worldwide are obtaining dramatic savings in COBOL CPU time and storage requirements *automatically* by using OPTIMIZER II, a program product from Capex.

Using techniques inaccessible to your programmer or compiler, OPTIMIZER II works as a final phase to any IBM OS or OS/VS compiler, automatically analyzing and optimizing every path, every loop, typically eliminating more than 30% of the compiled instruction. It's transparent—no system or source program changes are required.

And since it works at the machine language level, its savings are available even for your best hand-tuned programs.

Results: COBOL programs run faster and use less system resources. Storage requirements are reduced. Capacity is increased. Turnaround is improved. You get more from your current system; even more when you expand or upgrade.

OPTIMIZER II is a proven package. It's easy to install and benefits are immediate. More about how and why is yours for the asking:

Call (602) 264-7241
Or fill out and mail coupon.

capex CORPORATION
CAPEX CORPORATION
2613 N. 3rd St.,
Phoenix, AZ 85004
Product Section BD

Please send more information on OPTIMIZER II.

Name _____
Title _____
Company _____
St. Address _____
City, _____ State, _____ Zip _____

Offices nationwide: Atlanta, Boston, Chicago, Dallas, Los Angeles, New York, Phoenix, Washington D.C.

In Europe contact CGS Products: London, Paris, Dusseldorf, Brussels, Rijswijk ZH.

Distributed DP No Longer Vague Concept for Malmo

By Esther Surden
CW Staff

MALMO, Sweden — For the third largest city in Sweden, distributed processing is no longer a nebulous concept — it is an already-implemented, cost-saving alternative to using large mainframes to process the city's applications.

And it's an alternative that when properly designed — with the end user in mind — reaps rewards in user satisfaction, according to Nils Dahlberg, the city's DP manager.

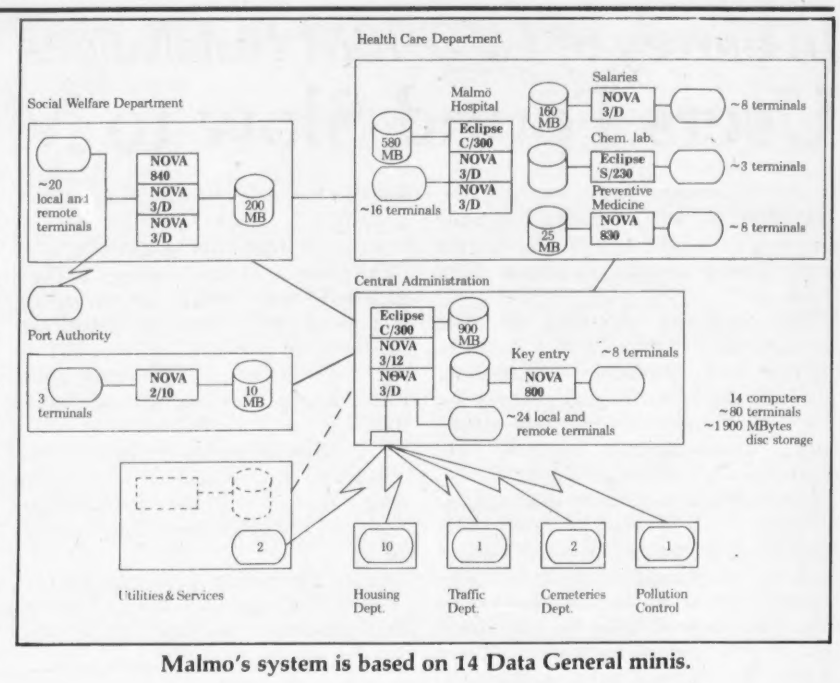
From its first brush with punch card equipment to the centralization of most of its applications on a mainframe, Malmo's DP history followed a traditional path.

By 1972 the city had large Datasaab systems and a centralized data base; all of its large applications were running in batch mode. In that year, the DP department decided to try to develop an interactive system, still using the large systems, for its social welfare application.

"We worked with the people in the field, we talked to the users and found that when we were finished there was much enthusiasm for what had been developed. It was no longer our system, it was their system," Dahlberg said in a recent interview.

The interactive processing created a heavy demand from users for more interactive processing, but Malmo's two large-scale systems had reached their limits.

The DP department calculated that in order to implement all the systems the city planned in interactive mode, a capacity of 130 transaction/sec was needed. No single system, large or small, could provide that capacity.



Malmo's system is based on 14 Data General minis.

The city then made some price/performance comparisons. For example, it found an IBM 370/148 with 2M bytes of memory and a capacity of 10 transaction/sec cost about 5 million kroner (one kroner equals about 23 cents), while a minicomputer with a capacity of 4 transaction/sec cost about 200,000 kroner. Thus it would take 13 large systems at about 65 million kroner to do the job that 32 minis could perform for 6.5 million kroner.

This CPU-to-CPU comparison came up with a 10:1 ratio in favor of minis, Dahlberg noted, and with the price/performance breakdown favoring the minis it was "easy to convince the city council" to give the go-ahead.

The manager estimated that when calculated on a system-by-system basis, the minis are 1.5 to 2.5 times more cost-effective than their batch counterparts.

"It took about two years to look at the mini market," Dahlberg recalled. "In 1974 no one was interested in interactive systems software development."

So the city looked for a company that could provide the tools it needed to develop the overall system. Data General Corp. could provide a multiprocessor communications adapter (MCA) as standard hardware.

The MCA allowed the DP department to link the minis.

All development work then stopped on the big systems and "during the next two years we worked on developing software for interactive processing." The city developed its own language with screen-handling techniques, communications routines, multiprogramming capability, Isam structure and multiterminal capability.

About 20% of the programming on the system is done in Fortran and the rest is done in the language the DP department developed.

Presently the city has 14 DG minis with about 80 terminals and disk storage totaling about 1.9G bytes. Ten different groups of users are running about 25 different applications.

Among the applications now tied into the distributed system are the Department of Social Welfare's system, which maintains waiting lists and books places in the city's nursery schools and old people's homes; the port authority system that bills harbor charges and performs all bookkeeping; the billing system for city's utilities; and the Department of Health's systems for patient administration and preventive medicine.

COMPUTER TERMINALS
Save Up To 40%

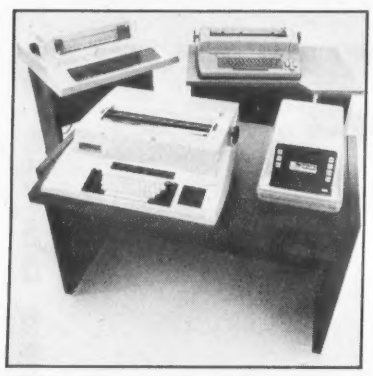
On purchase or lease of the following: Beehive, Hazeltine, Infoton, Lear Seigler, Decwriter LA 36, LA180, LS120, Diablo 1620-1, Texas Instrument 745, 743.

Example: DEC Writer III LS120 $2,975.00

CALL FOR A QUOTE
201-469-9344

Terminal Sales & Development Inc.
867 Sebring Ave., Bound Brook, N.J. 08805

When we plant a terminal...



It gets as much TLC as Marilyn gives her potted Spathiphyllum.

Terminals are just as sensitive as plants so it's important to pick the right one for *your* job. That's why Trendata offers a wide range of printing terminals and magnetic tape recorders to fit any number of applications.

And since terminal productivity stems from proper training, Trendata field reps make sure your people understand all the do's and don'ts of terminal operations.

Should maintenance problems arise, they are immediately pruned out by our own nationwide service people. The last thing you need is a terminal withering on the line.

As we mentioned, anything that grows needs TLC . . . and if your system isn't getting Terminal Loving Care, we'd like to cultivate a little conversation.

trendata
610 Palomar Ave., P.O. Box 5060, Sunnyvale, CA 94086 (408) 732-1790
AN APPLIED MAGNETICS COMPANY

erisa?

If the personal penalties for management violation of the Employee Retirement Income Security Act of 1974 have you worried, then take heart.

Wang has 360/370, Burroughs, Honeywell and Univac, ERISA software, designed, installed and running, coast to coast, safeguarding the pensions of more than one million workers and protecting the careers of their managers.

For more on ERISA, call Joe Nestor (617) 851-4111, Wang Laboratories, Lowell, MA 01851. In California, call Carl Tarascio (714) 631-0138.

WANG

COMPUTERWORLD

. . . the one weekly newspaper that's designed to fulfill your unique "need to know"... the one newspaper that can give you all the current information you need to benefit you, your organization and your career progress... 52 weeks of incisive news, commentary and special reports... subscribe today, use the attached postage paid order form.

☐ Please enter my subscription
(details on back)

☐ I'm already a subscriber, but I'd like you to change my:
- ☐ address
- ☐ title
- ☐ industry
- ☐ other

My current mailing label is attached and I've filled in new information on the other side.

Put old label or label information here

Please send me **COMPUTERWORLD** for one year. RATES: United States – $18 Canada and PUAS – $28
Europe and Middle East – $50 All Other Foreign – $65

☐ Check Enclosed
☐ Charge My American Express Account. If charge we must have cardholder's signature:

Signature: _____

Expiration Date: _____

First Initial		Middle Initial	Surname	
Your Title				
Company Name				
Mail To:				
City		State	Zip Code	

Address shown is:
☐ Business
☐ Home

☐ Check here if you do not wish to receive promotional mail from *Computerworld*.

☐ Check here if you're interested in receiving information on *Computerworld's* Index.

PLEASE CIRCLE 1 NUMBER IN EACH CATEGORY

BUSINESS/INDUSTRY
10 Manufacturer of Computer or DP Hardware/Peripherals
20 Manufacturer (other)
30 DP Service Bureau/Software/Planning/Consulting
40 Public Utility/Communication Systems/Transportation
50 Wholesale/Retail Trade
60 Finance/Insurance/Real Estate
70 Mining/Construction/Petroleum/Refining
75 Business Service (except DP)
80 Education/Medicine/Law
85 Government - Federal/State/Local
90 Printing/Publishing/Other Communication Service
95 Other: _____

TITLE/OCCUPATION/FUNCTION
11 President/Owner/Partner/General Manager
12 VP/Assistant VP
13 Treasurer/Controller/Finance Officer
21 Director/Manager of Operation/Planning/ Administrative Service
22 Director/Manager/Supervisor DP
23 Systems Manager/Systems Analyst
31 Manager/Supervisor Programming
32 Programmer/Methods Analyst
41 Application Engineer
42 Other Engineering
51 Mfg Sales Representative
52 Other Sales/Marketing
60 Consultant
70 Lawyer/Accountant
80 Librarian/Educator/Student
90 Other: _____

COMPUTERWORLD

CIRCULATION DEPT. 797 Washington Street, Newton, Mass. 02160

Detach here, fold, and place in post-paid envelope attached through binding.

Absolutely no distributed processing system offers you all these 10 features except Series 21 from MDS:

1. An intelligent data entry system which installs as easily as a keypunch and is fully operational as soon as you plug it in.

2. Formatted data entry software – fully developed and ready to use.

3. On-site upgradability so you can utilize a powerful programming language specifically developed for interactive processing with CRT/Keyboard.

4. Growth capability so you can accommodate your peak production periods by allowing expansion to up to four operator stations – any time – on one controller.

5. Modular design so you can configure a system to fit the requirements of your various locations – exactly, now and for the future.

6. A comprehensive line of peripherals, like large capacity disk drives, tape transports and printers, together with powerful systems software enabling high performance transaction processing.

7. Communications in BSC or SDLC, or both.

8. A large 15-inch CRT display in 480 or 1920 characters for easy operator prompting and sight verification of data.

9. A choice of either data entry or typewriter-style movable keyboards so you can use experienced data entry people or those with only clerical experience.

10. Popular flexible diskette recording media using IBM Basic Data Exchange conventions.

You can start with a basic low cost configuration – which means you pay only for what you need now. Series 21 was designed to take into account all your future distributed data processing system requirements by way of its upgradability. A Series 21 system with 4 operator stations costs only $110.50 per month per operator station, including maintenance, on a 3-year lease.

We would like to tell you more about Series 21 – and why we say it's absolutely the best distributed data processing system available anywhere.

Series 21 – a solution for today – and tomorrow. Call MDS Executive Headquarters at 201-540-9080, or fill out the coupon and find out more.

Tell me more about Series 21. I'm interested in applying it to _____ applications.

Name: _____

Title: _____

Company: _____

Street: _____

City: _____ State: _____ Zip _____

☐ Have a salesman call.
☐ Send me your latest information.

CW 4

1599 Littleton Road
Parsippany, N.J. 07054

MDS Mohawk Data Sciences

SEP 26 77
UMI

Scandinavians Seek Solutions to Dependency

By G. Russell Pipe
Special to CW

COPENHAGEN, Denmark — An association of top-level government and business DP executives here is encouraging public debate and public policy to reduce the impact of computers on employment, privacy, transnational data flow and other legal issues.

At a recent conference of the Nordic Data Union (NDU), Danish Minister of Justice Orla Moller opened a session by saying "The main reason for discussing the risk of computer dependency is the great efficiency of the machines which have major political consequences. It is claimed we are slaves of the technique because of its immense impact."

Some participants responded by stressing that the machine is not so much at fault as the resulting imbalances of power and loss of the ability to bring about social change attributed to DP.

But Moller discounted the threat of computers by noting that "they give politicians a tool for improved decision making." He cautioned, however, that "the more complicated the society, the more restrained the advice from specialists should be and the greater the role of decision makers."

The conference's theme was the increased dependency and vulnerability attributed to computerization in Denmark, Finland, Norway and Sweden. "National vulnerability is something countries must be vitally concerned about," according to Allan Eriksson, director of the Swedish Ministry of Defense's research committee on the subject.

Eriksson outlined three dangers:

- Concentration of computers in a few cities and a handful of major facilities.
- Technological dependence on DP for all forms of administration.
- Foreign data sources and services.

This heavy concentration of computer facilities and services is a product of centralization, particularly by national governments. It is a circular argument, according to one participant: "The concentration of computers requires a very big control system and vice-versa.

"If we could begin computerization today with all the knowledge we now have we could have stopped a number of techno-bureaucratic monsters," according to Jan Freese, director general of the Swedish Data Inspection Board.

"A techno-administrative alliance is believed to be a real threat to many Europeans, according to Paul Sveistrup, a Danish DP consultant and lecturer.

Computing has a bias toward the status quo because of the huge investments involved, it was noted. It was claimed this results in social paralysis, rather than causing needed reforms of government programs and in structures of commercial organizations.

Two Solutions

Two separate but complementary solutions were advanced to alleviate these problems: public discussions and debate on further "automation" of society; and creation of broadly representative data councils to conduct research and make advisory recommendations to governments and private industry.

"A main reason we are in this perplexing situation," Sveistrup believes, "is that the politicians, technicians, administrators and general public are not talking to each other on plans and goals for our societies."

By injecting public discussion and stimulating parliamentary concern, the "unholy alliance" between the technician and bureaucrat may be retarded, if not broken.

The concept of national data advisory councils, even with formal Nordic-level interaction, is not new. In Denmark an Economic Council studies trends and problems and submits suggestions to both government and business.

While no formal decisions were made, the chairman of the last panel, Prof. Knut Selmer of the Oslo University Law School, stated, "We have a much clearer picture of the problems and can go home to fit them into a plan of action."

Dossiers Under Probe

Special to CW

COPENHAGEN, Denmark — The Danish Government in 1969 forbade authorities from maintaining lists of persons because of their political beliefs or activities. It was recently discovered, however, that the editor of a Danish magazine, a right-wing conservative, has been keeping political dossiers on 60,000 persons and supplying their contents to the military security forces.

This practice was known to have been going on at least through 1973 and possibly longer and may involve improper government financial support.

Opposition parties in Parliament have called for a complete investigation of the affair. The Ministry of Justice, responsible for privacy legislation before the parliament, has downplayed any connection between the files and privacy.

Look who's here!

ICL and the System Ten 220

info 77
New York Coliseum
October 17-20, 1977
See us at Booth
No. 929

Ask about ICL almost anywhere in the world. You'll learn that we're Europe's largest computer producer, with manufacturing facilities on three continents and customers in 83 countries ranging in size from small businesses to multi-national giants.

Ask about our System Ten.
You'll learn that it's at work on five continents in over 4,000 installations with a proven record of dependability and operational features that out-perform any other mini-computer of comparable configuration.
Now we're introducing the newest generation of this respected series, the System Ten 220 and it's loaded with features you should learn about:

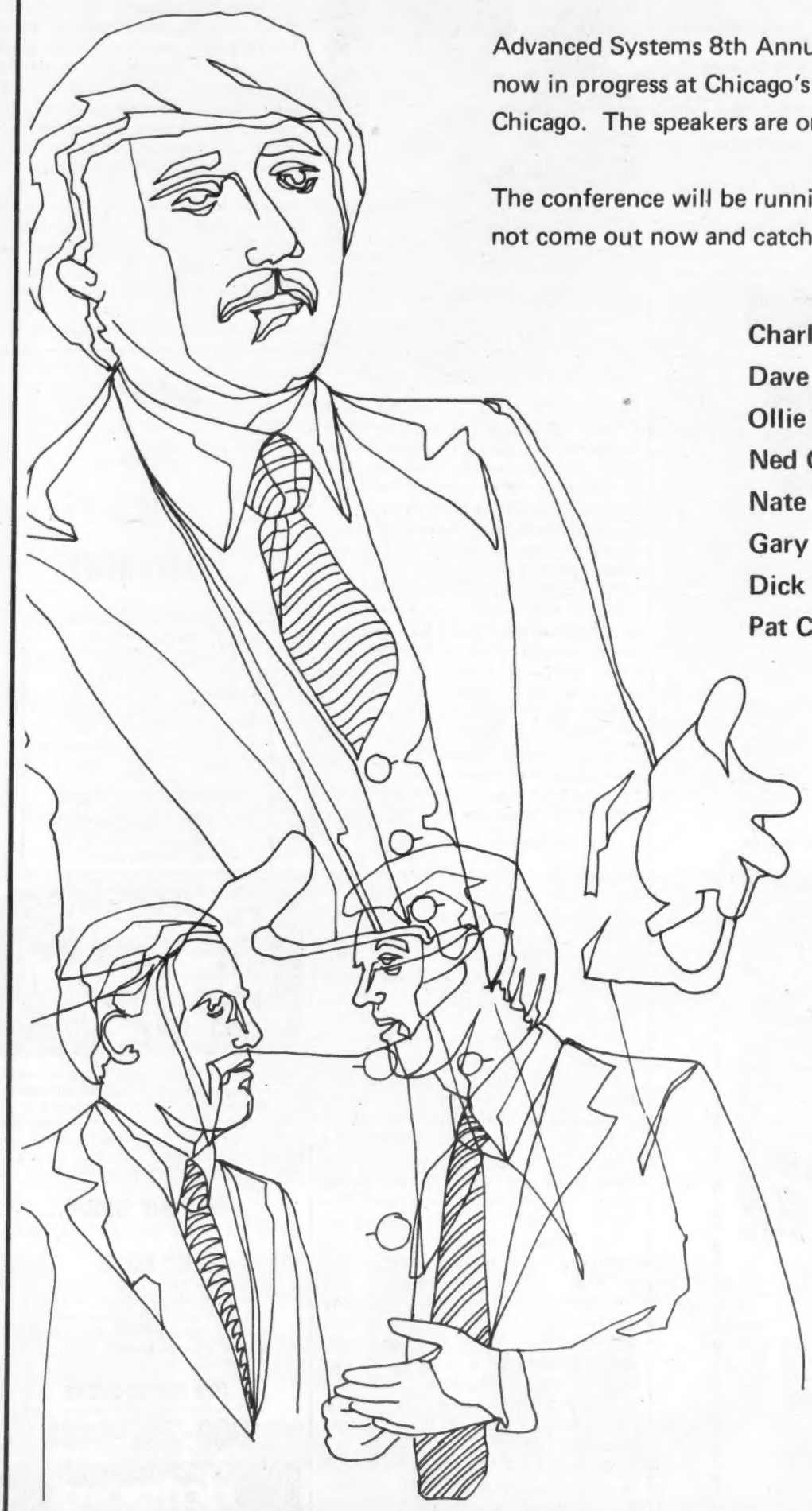
- A processor expandable from 20,000 to 160,000 characters
- A core that can be divided into as many as 20 partitions each running its own program and each able to handle ten I/O devices.
- A range of disc drives providing from 8 million to 160 million characters of on-line storage.

The System Ten 220 is ready for use with an extensive library of real-time packages for applications in Manufacturing, Retail Sales, Distribution and Service operations. Starting price for the basic hardware system is less than $40,000.
If you're a computer professional planning a new system or upgrading a present one, you should learn all about the System Ten 220.
Contact us now for full details on the System and on the $650 million world leader that was first in Virtual Memory, Platter technology, MOS storage and many other computer innovations that may surprise you.
Contact us today. We're here now...to serve you.

Count on us. Millions do.

ICL
Turnpike Plaza
197 Highway 18
East Brunswick,
New Jersey 08816
(201) 246-3400

its not too late...



Advanced Systems 8th Annual Professional Training Conference is now in progress at Chicago's Marriott O'Hare, 8535 West Higgins, Chicago. The speakers are ones that you won't want to miss.

The conference will be running through Tuesday Sept. 27, so why not come out now and catch the remaining speakers.

Charles Lecht	Paul Kennedy
Dave King	Herb Cohen
Ollie Wight	Belden Menkus
Ned Chapin	Stan Rifkin
Nate Newkirk	Dixon Doll
Gary Richetto	Carma McClure
Dick Thatcher	Ken Ulickey
Pat Coleman	Joe Pokorney

Because of you, since 1969, ASI has been #1 – and with your help, we will continue to be #1. We invite you to our 8th Annual Professional Training Conference which is now in progress at Chicago's Marriott O'Hare. If you are unable to attend the conference, as always, you are welcome to visit our studio and corporate offices in Elk Grove Village. For more information just give us a call at our toll free Customer Service number: 800-323-0377

From Illinois or Canada call collect: 312-593-1790

ASI

Advanced Systems, Incorporated
and its VAI subsidiaries • A URS COMPANY

Scheduling System Helps Double Court Docket

By Jeffry Beeler
CW Staff

PONTIAC, Mich. — Circuit court judges in Oakland County have nearly doubled the number of civil and criminal cases they try each year as a result of an on-line justice system that both schedules court cases and keeps track of all public records filed in the office of County Clerk Lynn Allen.

Since installing the computerized system, each of the suburban Detroit county's 11 circuit court judges has heard about 2,000 cases per year, compared with an annual average of only about 1,000 cases for their counterparts elsewhere in Michigan.

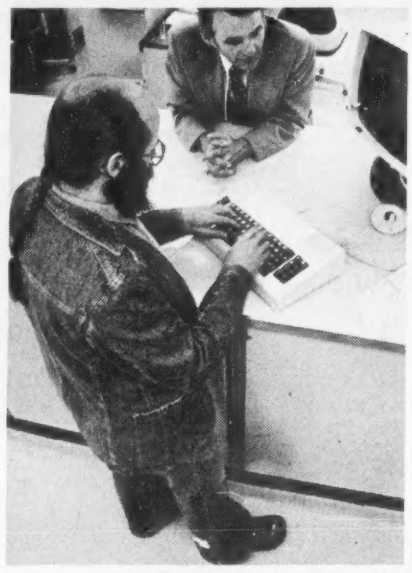
This jump in courtroom efficiency contrasts sharply with the trend in most of the nation's other courts, where judges have complained about caseloads that in some instances have nearly brought the criminal justice system to a standstill. They see speedier court trials as one way to combat the nation's soaring crime rate.

Built around 1M-byte IBM 370/148, the automated justice system uses a data base in the county clerk's office to schedule court appearances so they will not conflict with lawyer's agendas. In this way, full docket for each circuit judge is assured each day.

"Case backlogs occur when there is not a full docket of cases each day," Fred Mester, court administrator explained. "The best way to keep the docket full is to get trial notices to attorneys before they make other commitments."

To date, the justice system computer, which operates in the county's computer services Division, has inventoried legal papers for about 300,000 circuit court cases, with 5,000 to 7,000 entries added daily.

Besides speeding the flow of courtroom litigation here, the system has minimized personnel expenses in both the court administrator's and the county clerk's offices, Mester said. Since the county installed the system in 1975, neither office has had to increase the size of its clerical and administrative staff.



Anyone interested in an Oakland County court case can use a terminal in the clerk's office to check on it. Here, Deputy County Clerk Richard A. Elliott (behind counter) helps E. Leonard Howarth, a local attorney, retrieve information on a pending case.

The computer also allows the county to notify attorneys up to eight weeks in advance of their scheduled court appearances. Lawyers here previously had only two and a half to three weeks' notice, Mester recalled.

These longer leadtimes have proved an important asset for Oakland County, which competes for each attorney's courtroom services on a first-come-first-served basis with four other nearby counties, he explained.

From Days to Hours

Before the county installed the current system, officials maintained their trial records on cards that had to be retrieved manually when clerks needed important information, like the number of court actions of a given type still pending. With that recordkeeping system, Mester's clerical staff spent the equivalent of three days to a week each year just processing the county's trial notices. Today, the staff does the same job in about three hours.

Last year, the county administrator's office generated about 30,000 trial notices, (excluding adjournment and other types of notices); during recent years, the volume of paperwork has grown steadily as the number of criminal cases climbed from just over 9,000 in 1965 to slightly under 20,000 in 1975.

With the earlier system, the county administrator's office was also unable to perform a number of other important recordkeeping functions like keeping track of the number of cases of each type (mediation, malpractice, etc.) heard by each of the 11 circuit judges.

To eliminate these and other shortcomings, Mester and his staff replaced their manual recordkeeping method with the current system, which consists entirely of IBM hardware, including a Model 3286-2 printer, a 3704 communications controller, Model 3330-11 disk drive units and a Model 3277-2 CRT terminals.

Except for the CRT terminals, the system was configured from hardware already installed in the county's Computer Services Division.

The county administrator's office plans eventually to expand this configuration to include a CRT terminal in each courtroom, Mester said. When this proposed expansion takes place, circuit judges will be able to retrieve their caseload schedules from computer memory so they can plan their court appearances in advance and find out which of the county's courtrooms will be available at any given time or date.

Mester also plans to upgrade the system soon to track delinquent child support cases and to supplement the listings catalog in the county administrator's law library with pertinent titles from the Computer Service Division's five institutional libraries.

Terminal response time diagnosis.

If you suspect response time problems, find out for sure. Get the real response time with a TERMINAL RESPONSE TIME MONITOR. This is a hardware monitor that measures the average, minimum, and maximum response time along with the number of transactions. Terminal connection is by optical coupler which eliminates internal probe points. Operation is unattended and automatic. **Price: $950.**

For more information contact: **QUESTRONICS, INC.**
3596 South 300 West
Salt Lake City, Utah 84115
(801) 262-9923

MODEL 204 IS POWERFUL

VOLUME KEY PUNCHING
(402) 592-1686
"QUALITY AT LOWER COST"
AMERICANA KEY PUNCH
4345 South 89th St.
Omaha, Nebraska 68127

TC 3002
Acoustic coupler/modem

STANDARD FEATURES
- Power & carrier indicators
- 1 year factory warranty
- Originate & answer mode, standard
- EIA RS 232 C & TTY interface, simultaneous
- Leased & private line interfaces, standard
- Acoustic & DAA line connection, standard
- 300 baud, full or half duplex transmission over the switched telephone network.
- Signal/noise ratio carrier detect circuitry suppresses erroneous or false data.
- WE 103, 113, 105 & 101 compatibility

ONE YEAR WARRANTY

SALE PRICE $235.00
Rental Price (W/Equipment) $10/Month

Quantity Purchases ..... 1-9 ..... $235
10-24 ..... $225
25-99 ..... $210
100-up $195

Interface Cables
EIA — RS 232 ..... 10'..... $21.00
Teletype Current Loop ..... 10'..... $16.00
LA36 Current Loop ..... 10'..... $16.00
CDT (1000A) DAA ..... 10'..... $ 9.00

Get complete details with a direct call:
800/527-7700
or 214/252-7502 • Service 800/527-5608
TWX 910/806-5761 • TELEX 73-0022

vardon & associates, inc.
930 N. Beltline Road • Irving, Texas 75061
A Subsidiary of Pioneer Texas Corp.

A 3-day Introduction to EDP

This non-technical seminar is intended for management and staff members who do not have an EDP background. It will help them communicate effectively with the DP department, and will explain how to effectively use EDP resources as a management information tool.

At your place...
Fixed fee presentations in your facility

...or ours
Individual enrollments open for
- New York: October 26-28
- San Francisco: November 2-4
- Washington: Nov. 30-Dec. 2
- Chicago: December 12-14

for
FREE COURSE OUTLINE
and full schedule of EDP seminars, call
800-257-9406

datapro
1805 Underwood Blvd., Delran, NJ 08075
In NJ call 609-764-0100

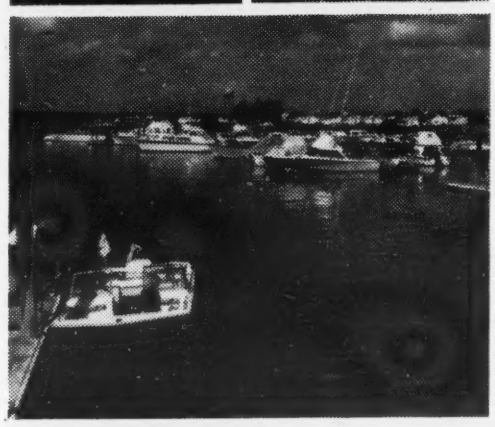
Hendrix/ New Hampshire

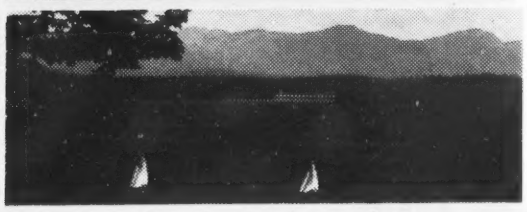
The Best of Both Worlds.

HENDRIX's extraordinary growth is a result of an environment that encourages rapid achievement and advancement for talented individuals. In just a few years, we've become a world leader in providing sophisticated text editing systems to newspapers, commercial printers and large offices. Now, the demand for our interactive, minicomputer-based systems is creating additional outstanding opportunities for dedicated and imaginative computer professionals.

And just as you'll get more out of working at HENDRIX, you'll get more out of living in Southern New Hampshire. In our 4-season climate, HENDRIX employees and their families enjoy skiing, boating, swimming, and a wide variety of other recreational activities all year round. And we're just a short drive away from any of the cultural and educational resources of New England.

Come share in the success of our continuing development and the benefits of our ideal location . . . the best of both worlds.





Software Manager

In conjunction with your staff of Senior Programmers, you will be responsible for the overall design specification software development and system integrity of a multi-processing system. This system, which will be installed at a large metropolitan newspaper within the next two years, consists of two dual processor DECsystem-1099 host machines with up to 32 PDP-11 peripheral controllers and over 300 intelligent terminals. Applications will include the automation of the editorial, classified advertising, production operations and support for the overall commercial EDP operations of the newspaper. The complete system must have the capability to be expanded to meet the requirements of the second phase of systems specifications. This expansion is expected to produce the next generation of newspaper publishing systems.

In addition to the direct line management of your immediate staff, you will provide technical leadership and guidance to a large staff of professionals involved in this project.

We require at least 10 years large computer system experience, including a detailed knowledge of distributed processing, and experience in software development management. You should also be familiar with time sharing operating systems and macro level programming systems. It would be desirable, though not necessary to be experienced in one or more of the following: the TOPS-10 monitor, newspaper publishing systems, PDP-11 based communications network, higher level systems languages.

System Programmers

We currently have positions available in several areas for experienced PDP-11 System Programmers. They all require professionals with a detailed knowledge of assembly level software development and familiarity with distributed processor system concepts. Openings exist at all levels of seniority from entry level to and including group leader.

- COMMUNICATIONS
  Involved with high speed parallel communications channel between host 1099 and PDP-11's. You'll need device driver programming experience under the TOPS-10 monitor system and a thorough knowledge of PDP-11 operations.
- APPLICATIONS
  You'll design and implement publishing system software. Knowledge of computerized newspaper applications and/or text processing desired.
- DATA BASE
  We're looking for key specialists to be responsible for the design and implementation of a large editorial data base using complex queue and access mechanisms. Base must be designed with minimum access time as the top priority goal with complete redundancy as a given requirement.
- SYSTEM INTEGRITY
  This position has responsibility for the analysis of a large multi-processor publishing system plus the development of guidelines and operating procedures to insure 100% data base integrity, in case of any two-processor failure. You'll also develop system test and acceptance programs for the final testing of systems integrity.
- MICROPROCESSOR
  You will create real time development/research systems or develop applications programs for custom communications packages based around an 8080 microprocessor.

We offer comprehensive benefits and outstanding salaries.

Please forward your resume outlining salary history to J. Paul Costello, Hendrix, Personnel Department, 645 Harvey Road, Manchester, New Hampshire 03103.

an equal opportunity employer

HENDRIX

System Analyzes Students' Journalistic Skills

By Denise Petski
CW Staff

MADISON, Wis. — Students at the University of Wisconsin-Madison School of Journalism here not only have to withstand the criticisms of their editors and professors but must also be subject to the analysis of a computer.

Prof. Kenneth D. Nordin used the computer in a news writing course at UW-Madison for the first time last fall, and it is still in the experimental stage.

The "Newswriting Analysis Program," which was developed at the University of Michigan by Prof. Robert L. Bishop, contains information on about two dozen "newsworthy" events and supplies a set of raw facts from which students can work. After a student writes a story, it is fed to the computer, which then sends back a list of critical comments.

Run on the university's Univac 1110, the program can spot repetitive sentence structure, overuse of adverbs and passive verbs, certain "planted" errors, inadequate use of quotes, libelous statements, good first paragraphs, overblown words and missed details. The computer provides appropriate feedback such as "good" or "Did you forget . . . "

Student reaction has been "at least cooperative and generally positive," Nordin said. The students seem to be intrigued that a computer can analyze their work. At present, 16 students can take part in the program at the same time, but the ultimate goal is to involve a much larger number.

While Bishop designed the program as a self-taught primer in basic news writing, Nordin sees the need for an instructor to look for things the computer doesn't see: the flow of words, transition of ideas and unity of thought within paragraphs. "Those kinds of things the program just can't pick up," Nordin explained.

Nordin believes, however, that there are objective and teachable standards for journalistic writing, and the computer helps make the point. "It's a very efficient way to make students aware of some of the basic elements of news writing."

Egg Farm's System Keeps Profits and Standards High

FOREST CITY, Fla. — In this small agricultural community just north of Orlando, the classic chicken or egg dilemma has received a new twist. It all started with the introduction of computer technology to the egg production industry.

Musselwhite Farms is one of the area's largest egg producers. According to the firm's controller, Don Bridge, the company has as many as one million chickens housed at 26 local contract farms in the area.

Each week Musselwhite receives and grades 300,000 dozen eggs. Data gathered from this "grade out" process is entered into an NCR 8200 computer through CRT terminals for processing via the egg settlement system. The system records egg production and runs comparisons using weekly standards, by strain of chicken, for jumbo, extra-large, large, medium, small and pee-wee eggs within Grade A.

Grade B, crax or odd-shaped eggs, stains, losses, pick-outs and "bloods" make up additional grading categories. The system also compares weight and mortality standards with actual results.

Once the data is entered into the computerized egg settlement system, the computer analyzes the information. Using the output, Musselwhite is able to compensate the farms and provides the farmers with vital production statistics.

Production information is critical to the profitable management of the farms — each of which specializes in a particular breed. Production data from the computer is compared to standards provided by the breeder, and problems which cause production drops are spotted immediately.

The egg settlement system was designed by American Software and Computer Services, Inc., a Tampa-based computer service firm. According to Larry Hires, systems engineer on the project, plans are now being developed for visual graphs of the production statistics. One graph per farm per week will be produced so that a picture of actual production versus the strain's standard will make for instant reference without the use of tables of numbers.

MODEM USERS:

PUT A COMPUTER IN PLACE OF YOUR MODEMS, THEN WATCH WHAT HAPPENS.

THE MP-48 LETS YOU DO IT RIGHT NOW.

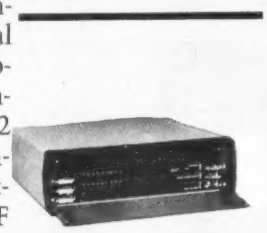
The MP-48 is the industry's first computer made into a modem. What's so good about that. Plenty.

Other modems control circuit paths under rigid hardwired tolerances. The MP-48 emulates them in a constantly adjusting mode that comes close to a line's actual theoretical performance. The result: nearly total elimination of ambient errors.

The MP-48's computer is program-controlled. That means its filters and digital equalizers "learn fast" in adapting to line conditions. The result: a 35 millisecond train time for multi-drop networks.

The MP-48's computer is powerful. It allows you to run four-wire full-duplex multi-drop, two-wire half-duplex multi-drop or point-to-point networks — with a two-wire dial-up capability — using the same modem. At 4800 bps. The results: more drops per line and more freedom to alter networks.

The MP-48 is reliable. Ultra-reliable. Its computer's LSI chips are perfectly repeatable in manufacture and performance. Its all-digital circuitry permits operation on unconditioned 3002 lines and general switched networks. An MTBF of 20, 000 hours is unmatched in the industry.



The MP-48's computer is adaptable. Its read-only memory can be field-altered to meet most geographic or international standards. It has alternate voice capability option, and two-call manual dial back-up option. The result: it becomes what you need right where you need it — on-site.

The MP-48's computer is inexpensive. The result: you can buy an MP-48 for under $3,000, lease one for less than $75, and get delivery in about 30 days.

The MP-48 from Paradyne. The next generation of modems has begun.

Tell me more about the MP-48.
☐ I have an immediate need for 4800 bps modems.
☐ I have a longer-term need, and would like to speak with a salesman.
☐ Please send me literature.

Name:
Title:
Company:
Street:
City: State: Zip:
Telephone:

paradyne

Paradyne Corporation, 8550 Ulmerton Road, Largo, Fla. 33541 (813) 536-4771

TELETYPES®

Model 43KSR 30cps Data Terminal

New and Reconditioned
Models 28 • 32 • 33 • 35
40 • 43

FEDERAL Communications Corporation

11105 Shady Trail #107
Dallas, Texas 75229 U.S.A.
(214) 620-0644 TELEX 732211

Chase Vice-President Explains

Giros Help Consumers Keep Payment Control

By Toni Wiseman
CW Staff

NEW YORK — The concept of Giro payment services is widespread in Europe, but it is little understood and less implemented in the U.S.

There are various ways in which Giro payment alternatives interface with the electronic payment infrastructure — standing orders. Telephone instructions, authorized bills and automated teller machines (ATM); each offers certain benefits, according to George C. White Jr., vice-president of The Chase Manhattan Bank N.A. headquartered here.

For the consumers, perhaps the main advantage of using Giros is that he can control the timing and amount of his payments; with preauthorized payments, he loses such control.

"A Giro system is basically a payment system which allows a consumer to pay bills by instructing his own bank to transfer funds to the account of his creditor, in whatever bank it exists," White explained.

"As opposed to the debit flow of funds associated with normal bill paying with checks or preauthorized payments through automated clearing houses, Giro systems involve a credit flow of funds. As a result, one clear advantage of Giro payments is that returns for reason of insufficient funds are eliminated," he said.

Payments Simplified

The present check-processing system entails the clerical effort of check writing, difficulty in using funds as effectively as possible because of the variations in mail delivery and the cost involved in mailing and processing the check — a possible total of up to 28 cents per check.

A Giro system would simplify payments by combining bills or initiation of payments, ensuring complete control of date of payment for efficient use of funds and by providing a record of the organizations paid, eliminating reconciliation of paid checks, White said.

Giros would benefit corporations by making funds available on the day designated by the consumer; they would be relieved of the chore of depositing individual checks, he said. It would also simplify accounts receivable updating because payment data is submitted in machine-processable form, such as magnetic tape, White pointed out.

Four Methods

White outlined the four ways in which consumers can use Giros:

- Standing orders. A consumer can have his bank automatically generate constant-amount, periodic payments, for such things as rent, installment loans or utility budget payments. The bank is told the necessary information at the inception of the arrangement, stores it and includes it with the generated credit payments.
- Telephone instructions. A bank can be given instructions by phone to pay specific bills. This can be done either by conversation with bank employees or by direct connection to a computer via Touch-Tone telephones.
- Authorized bills. A customer can sign and physically deliver (via mail or in person) bills to be paid. This can be economically attractive if companies use some standard data line for the optical scanning capture of the data on the billhead.
- Automated teller machines. Consumers can instruct their banks to pay specific bills by use of an ATM transaction, using a debit or other plastic card. Banks would prestore company information because it would not be practical to have it entered each time at the ATM by the consumer.

Workshops on Privacy Scheduled for Phoenix

PHOENIX — A series of three-day workshops here this fall on security and privacy will discuss the recently published reports from the Federal Privacy Protection Study Commission.

The workshops, sponsored by Honeywell Information Systems, Inc., will he held Sept. 27-29, Oct. 12-14, Nov. 15-17 and Dec. 6-8.

A special discussion in each workshop will cover the impact of some of the commission's conclusions.

The preregistration fee of $425 includes workbooks and related study material.

Further information is available from Jerome Lobel at HIS, P.O. Box 6000, MS-K99, Phoenix, Ariz. 85005.

ATTENTION
IBM 360/370 COMPUTER USERS
IN KANSAS CITY

ULTIMATE COMPUTER SERVICES is prepared to assist you in repairing or restoring your equipment if it was damaged in the recent floods.

All equipment serviced will be guaranteed for your maintenance vendor's MA. We will work with you or your insurance company to insure that all work will be done as quickly as possible and at a minimum cost.

For further information, call U.C.S. collect at (201) 361-8600 and speak to either Al Cosenza or Buck Buchanan.

UCS
Ultimate Computer Services

INTERACTIVE
EXPENSE CONTROL SYSTEM

The system that lets you control your expenses by providing you with up to the minute information. It is available on any computer that supports ANSI-COBOL. The system completely interfaces with any general ledger, accounts payable, accounts receivable, payroll or purchasing system including our own interactive ones. Also available as a complete turnkey system including hardware.

- Cash Control
- Travel Advances
- Expense Distribution
- Employee Reimbursement
- Vendor Reconciliation
- Relocation Expenses
- CRT Data Entry
- On Line Inquiry
- Distributed Processing
- Written in Cobol
- Your Computer or Ours
- Guaranteed Installation

INTERACTIVE COMPUTER SYSTEMS
27 Andover Street, Danvers, MA. 01923
(617) 774-8668
BUSINESS SYSTEMS SPECIALISTS

ACCOUNTING PURCHASING MARKETING

TRANSPORTATION

Please send me information about your interactive:
☐ General Ledger
☐ Accounts Payable
☐ Accounts Receivable
☐ Payroll
☐ Order Entry
☐ Inventory Control

☐ Please send me more information on your interactive expense control system. I am interested in a:
☐ Complete turnkey system
☐ Comprehensive version for our computer. We have a computer.

Name _____ Title _____
Company _____ Phone ( ) _____
Address _____
City _____ State _____ Zip _____

MANUFACTURING

RETAIL INSURANCE DISTRIBUTING

TSI
The Professional Seminar Clearing House
and
ETHNOTECH, INC.
Are proud to announce a one-day seminar by
GERALD M.
WEINBERG
DONALD C.
GAUSE
DANIEL P.
FREEDMAN
Measuring And Increasing User Satisfaction–

This program demonstrates practical methods for actually measuring user satisfaction, and then provides practical techniques for raising the level of that satisfaction.

Plan now to bring your team of DP Managers, Systems Analysts, Designers, and Users to benefit from this breakthrough in User/DP inter-action.

For a detailed course outline, simply call us, collect, at (212) 764-3070, or complete and mail the coupon below.

CW-4
TSI Sales and Marketing, Inc.
19 West 44th Street, New York, N.Y. 10036

Gentlemen: Please send me the detailed course outline for **MEASURING AND INCREASING USER SATISFACTION — New Techniques by Weinberg, Gause, and Freedman.**

☐ Please place me on your mailing list.

Name _____
Title _____
Co. _____
Dept. _____
Address _____
City _____ State _____
Zip _____ Phone _____

Editorial

Alternatives Growing

The ongoing series of articles in *Computerworld* on the results of a survey of large IBM users proves one point conclusively: The alternatives facing computer users are growing every day.

In the past, an organization usually stuck with equipment from the manufacturer of the first system it installed, upgrading within that manufacturer's line. It was rare for a user to switch from IBM to any of the other manufacturers or vice versa.

The investment in programming, training and support was just too great an obstacle. The cost of conversion from one system to another severely limited a user's options.

But all that has changed, thanks to two developments: alternative mainframes and distributed processing.

Most large users in the survey — which was admittedly a limited sample, with 20 users contacted — have at least considered alternative mainframes for their present IBM installations and a majority were at least considering distributed processing alternatives [CW, Sept. 19].

But while all that is encouraging, there was also some not-so-good news.

For example, almost 30% of the people who had considered the alternative mainframes did not take the extra step of actually evaluating those offerings. Furthermore, there was a great deal of confusion over what was meant by distributed processing.

It is discouraging that a relatively high percentage did not actually evaluate alternative equipment, because it should be the responsibility of all DP shops to look carefully at any method of possibly reducing costs.

In most organizations, DP is an overhead item and DP operations are often criticized for their high costs. Without careful evaluations of ways to save money, DPers leave themselves open to the charge that they do not care about the profitability of the coporation they serve.

This is not to say that alternative mainframes will be right or cost-effective for everyone — clearly they will not be. However, without a real evaluation of those alternatives DPers will not know whether they will fit into their particular organization.

The confusion over distributed processing is also disturbing. If DPers are confused about the meaning of the terms they use, then upper management must be even more confused as it hears the terms bandied about. DPers have a responsibility to communicate with top management and they probably should do it in a jargonless form if they want to be understood.

Users — particular IBM users — are going to have even more alternatives from which to choose in the future and this is going to place a great deal of responsibility on the DP manager.

No longer will DPers be able to comfortably stick with one supplier, slowly wending their way up the upgrade path. They will have to perform more in-depth evaluations of the alternatives available.

This may make DP manager's job more difficult, but the opportunities for true cost savings will make the effort worthwhile.

'Well, Put It This Way, Folks — If There Is Anything Sacred Anymore, We're Not Aware of It . . .'

Data Past

Five Years Ago
Sept. 27, 1972

WALTHAM, Mass. — Honeywell Information Systems introduced two computers in its Series 2000 family and announced major enhancements including communication facilities for its small Model 58 computer system. The 2040A and 2050A systems could be upgraded at the customer's site by adding power modules and memory units.

— — —

EL SEGUNDO, Calif. — Xerox announced two enhancements for users of its XDS virtual memory system. Real core memory support was increased from 512K to 2M bytes for the Sigma 9. A disk-only system was provided to replace the rapid-access device system for residency and swapping previously required by the Sigma 6 and Sigma 9.

Eight Years Ago
Oct. 1, 1969

WASHINGTON, D.C. — A national microwave comunications network in direct competition with the Bell System was planned by Microwave Communications, Inc. When conceived, the network would mark the first time common carrier facilities were available from nontelephone sources on a nationwide basis.

— — —

GRAND RAPIDS, Mich. — The IBM System/3 faced its first rival with a small system introduced by Cascade Data Systems. The 88/30 offered reader speeds similar to the faster reader on the IBM system and added four cartridge tapes. The system sold for "under $30,000" or rented for about $675/mo compared with the approximate figure of $1,000/mo IBM charged for its System/3 with comparable reader speed.

Letters to the Editor

RCA Offered 360 Mode

Allow me to calm the astounded Seymour J. Metz ["Spectra Not IBM Compatible," CW, Sept. 12].

Metz is correct in stating that RCA's Spectra and 2,3,6 and 7 compared to IBM 360s have significant architectural differences. However, he does not seem aware that in 1970 RCA offered to the commercial market a fully supported software package called "360 Mode of Operation."

This site-tailored program resided in the Spectra system's high memory and simulated IBM 360 IPL and privileged instruction execution. 360 Mode translated 360 channel programs to Spectra, executed those channel programs and translated interrupts to 360.

Model 360 disk packs, tape volumes and unit-record files resided on RCA equivalent devices, without change. 360 Mode supported IBM 360 DOS, OS and stand-alone utilities and, believe it or not, is still in production at several installations.

After RCA's demise, Univac continued to sell and support RCA's 360 Mode, now offering similar 360 and 370 modes of operation on Univac 90/60, 90/70 and 90/80 systems.

Amdahl might take note that, in part, because of IBM's ability to quickly cause any given alternative system to become obsolete, RCA's and Univac's intentions seem to be to provide a smooth means of conversion to the vendor's "native mode."

Jerry B. Nesmith

Atlanta, Ga.

Standards of Good Practice

As vice-president of the Society of Certified Data Processors (SCDP), I couldn't agree more with Alan Taylor's column of Sept. 5.

The SCDP, as a charter member of the Institute for Certification of Computer Professionals (ICCP), looks to the institute to define standards of good practice and good conduct. The institute has designated Oliver Smoot as chairman of this standards committee.

Naturally, he can't complete his task for the ICCP alone. Even though it requires the ICCP's neutrality, he will need to rely on coordination with the American National Standards Institute (Ansi), the American Federation of Information Processing Societies (Afips) and constituent groups.

We're all in this together and working together is the best part.

J.J. Martin

Memphis, Tenn.

South African Figures Wrong

The Aug. 22 issue contained an article on the South African computer market ["South African Users Tighten Belts"] in which you stated that IBM possesses approximately 50% of the market with ICL second, holding 25%.

This is totally inaccurate and the exact figures are broken down as follows:

Firm	Systems Installed/ On Order	Share Of Sales (%)
ICL	395	33
IBM	340	34
Burroughs	127	14
NCR	101	4
CDC	12	7
Univac	39	8

From the above, it can be seen that ICL is the leader in the number of systems with IBM very marginally ahead on sales value.

Susan E. Croft
Public Relations Executive
ICL, Inc.
East Brunswick, N.J.

FOR 10 YEARS

AMERICAN USED COMPUTER
CORPORATION

HELPED **4000** USERS

STRETCH
THEIR COMPUTER BUDGETS!

370 ★360 ★CENTRONICS
★UNIVAC ★DG ★DEC
★170 TOP VENDORS

WILL BUY!
ANY 370
135, 145, 158, 168
SYSTEMS OR COMPONENTS

FOR SALE OR LEASE: **370/145, 158**
360/75 COMPLETE SYSTEM, **I/O** SETS
1443N-1 (FROM $9950), DISKS & MEMORY
LEASE: **3211/3811** PRINTER SUBSYSTEMS

DEC
90 DAY USED GEAR WARRANTEE

PDP 8
DATASYSTEM 340
PDP8e, 16K,
(2) RK05 (2) VT05
165 cps PRINTER,

CPUs: 8i, l, m, f, LINC 8, 12
MEMORY: WIDE RANGE
DISK: DS32/DF32
PRINTERS, TERMINALS,
CARD I/O, ETC.

PDP 11
DATASYSTEM 354
PDP11/10, 16K,
(2) RK05, VT50

CPUs: 11/10, 20, 40, 45
DISKS: RK05, RK03, RP02
TAPE: TC11, TU55, TU56
MEMORY: MM11K, MM11L
PRINTERS: 100 TO 600 lpm

OVER 700 DIFFERENT UNITS IN STOCK!

AMERICAN USED COMPUTER CORPORATION
617-261-1100
P.O. BOX 68, KENMORE STATION BOSTON, MA 02215

WE BUY, SELL, TRADE, AND APPRAISE ALL COMPUTER EQUIPMENT

FIRST CLASS
PERMIT NO. 41186
BOSTON, MA.

BUSINESS REPLY MAIL
POSTAGE NECESSARY IF MAILED IN U.S. A.
POSTAGE WILL BE PAID BY

AMERICAN USED COMPUTER
CORPORATION
P.O. BOX 68, KENMORE STATION
BOSTON, MASSACHUSETTS 02215

AMERICAN USED COMPUTER

617-261-1100 PO Box 68, Kenmore Station, Boston, MA 02215

CENTRONICS

★ FOR IMMEDIATE SHIPMENT ★

101A	165 CHAR/SEC, 132 COL., 60 LPM 2 CHANNEL VFU, TTL, 8-BIT PARALLEL	$1500
102A	330 CHAR/SEC, 132 COL., 125 LPM 2 CHANNEL VFU, TTL, 8-BIT PARALLEL	$2000
103	165 CHAR/SEC, 132 COL., 70 LPM, SELF TEST, ELONGATED BOLD FACE, LSI CIRCUITRY, BIDIRECTIONAL PRINTING	$2000

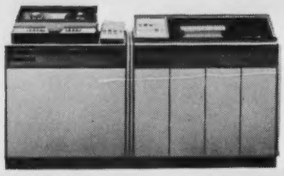
• • • INTERFACES FOR DEC, DG, AND RS232 AVAILABLE • • •

1403-N1 SPEED
AT 20% OF THE COST

A COMPLETE FACTORY REFURBISHED DATAPRODUCTS OFFLINE 1333LPM PRINTER SYSTEM

- INCLUDES TAPE DRIVE
- MAINTENANCE AVAILABLE

$9500



UNIVAC 1108 & 494

COMPUTER POWER AT ITS BEST!
COMPLETE SYSTEMS AND COMPONENTS IN STOCK

SHORT TERM LEASES

•3 MONTHS and UP•

★ DEC PDP 8 & 11 Systems/Components
★ DG Nova 2, 1210, 820 Sys/Comp
★ IBM Series 1
★ IBM System 3
★ Teletypes
★ Centronics Printers
★ Olivetti P6060
★ Lear Siegler CRTS

COMPUTER WAREHOUSE

OUR MICROCOMPUTER STORE DIVISION

Here's Our Answer to IBM 5100, Wang 2200, HP9830/31 -- And it saves you $6000!

OLIVETTI P6060

INTEGRATED COMPUTER SYSTEM
BRAND NEW

★ Powerful BASIC oriented Computer System ★ $8950
★ Twin Full-Size FLOPPY DISKS
★ 80 char./sec PRINTER ★ Full function 96-Key Keyboard
★ 16K user space,32K OP System + Basic Compiler
★ Expandable

ORDER OUR CATALOG!

$1 FOR 1st CLASS POSTAGE / HANDLING

- MICROCOMPUTERS

SWTPC 6800	IMSAI 8080
MOTOROLA 6800 D2	IASIS 8080
KIM 6502	OLIVETTI P6060
INTERSIL 6100	ICOM
NATIONAL SEMI SC/MP	GIMIX, ETC.

- BOOKS: OVER 275 AVAILABLE
- PERIPHERALS: LINE OF INEXPENSIVE USED GEAR TO PROVIDE UNMATCHED COST/PERFORMANCE
- FULL LINE OF COMMERCIAL OFFERINGS

COMPUTERWORLD

□ SEND ME YOUR CATALOG . . . HERE'S MY $1 FOR 1st CLASS POSTAGE & HANDLING

□ I WANT TO BUY: _____

□ I AM INTERESTED IN: _____ □ MORE DETAILS ON: _____

□ CALL ME AT: _____

□ I WANT TO SELL: _____

ADD ME TO MAILING LIST FOR:
□ BIG CPUs □ MINIS
□ MIDIS □ MICROS

NAME: _____ TITLE: _____

FIRM: _____

STREET: _____

CITY: _____ STATE: _____ ZIP: _____

Success Story Nominations Come Rolling In

By Jack Stone
Special to CW

There you go again! When the issue gets deeply personal, the exquisite communications capability that lies dormant in so many DPers comes roaring forth. In this case, I refer to the quality of nominations I have received in response to my search for the DP Success Story of the Year [CW, Aug. 22].

In this column, I want to provide a progress report on my quest, a change in ground rules and some guidelines for "success" as a remote computing service bureau — as originally developed by the Marquis de Sade.

First, good looking nominations have been received from: Pepperdine University, Malibu, Calif. Montgomery County Government (Md.); Garst & Thoman Hybrid Corn Co., Coon Rapids, Iowa; Catholic University (D.C.); Unisystems, Inc., Dallas; BancOhio Corp., Columbus, Ohio; and du Pont, Inc., Wilmington, Del.

Second, I received a bunch of indirect nominations from the Univac News Service and another one for the Mead Corp. Data Center in Dayton, Ohio. Sorry, nominators, but the rule is that the installation itself must come forth with the letter of justification.

Third, having been soundly chided by several readers for limiting the search to only 93% of the population by excluding scientific-oriented installations, I have lifted all restrictions on applications orientation. However, I will install a uniform questionnaire to be answered by all nominees requesting, among other things, that they define the success criteria they used and the measurements employed.

Remember, to nominate your installation (IBM 370/145-class machine or larger) as the DP Success Story, send a letter of justification to me,keeping its length to under 500 words. Include an OK to use your and your firm's names plus an invitation to me from a person in authority so I can interview members of the staff for subsequent writings (travel at my own expense). Each nomination will be acknowledged with a complete set of my CW articles. Also, I'll drag in some big guns to discuss the nominations before the final selection.

Of course, lurking in the background during this frenzied search is the as yet unanswered question : Will Stone's Theorem on DP success — that humanistic goals must be met before technical/business goals will be achieved — be validated or rent asunder? Well, if

Letters to Stone should be addressed to him at Suite 222, 2233 Wisconsin Ave. N.W., Washington, D.C. 20007.

Al Muehlberger's letter is any guide, I'm on the right track. Let me quote the two introductory paragraphs from his nomination letter for Montgomery County government, where he is the director of management information services;

"My orientation to my job is non-technical. I advertised myself to my current bosses three years ago as being a people-oriented manager and not a bit-chaser. My personal interests lie in the more sociological-type things — the effects of which I try to bring to the job.

"I contend, as I think you are saying, that the successes we are looking for in the field are only going to

The Human Connection

come about when we seek them in human terms and take into consideration the total human atmosphere in which they are to be pursued and made useful. In that pursuit, we have to understand human behavior.

"I don't think anyone is confident enough to come right out and say 'Look at us — because we're a success.' There is too much insecurity in all of us to take such a risk. We all have successes and failures. Human nature being what it is, we are all afraid to brag too loud because we each live in some kind of glass house and could be made fools of too easily. When there is some confidence and some success, we should feel safe to proclaim it accordingly — but be ready enough to deal confidently with the failures. We think our department is like that . . ."

Now for the piece de resistance! Consistent with the "success" theme, I just had to present you with some basic guidelines on how to operate a "successful" OS/TSO/370 service bureau, based upon a recent particularly agonizing experience of mine:

1. *Be sure to include in the user's manual intricate detail on key terminal commands that are not supported.* This strategy encourages the sophisticated terminal user to (a) go out of his everlovin' mind trying to untangle the garbaged output before he gives up in total disgust, then (b) call the so-called "user support" group for assistance so that he may receive the comic book response, "You know, we really ought to clean up that manual."

2. *As a full service correlary to Guideline 1, make certain that other key commands that are not supported are specified in the HELP data set.* This tactic is insidious, to say the least, because the user will figure that HELP is right where the manual is wrong. A particularly diabolical twist is to include in HELP an *unsupported* foreground Cobol compile command.

3. *Emphasize in your marketing programs a very wonderful time-sharing capability and then permit only background compiles.* You can add some high-powered fuel to the hot temper of the users by providing a whiz-bang 25-minute background Cobol compile.

4. *Keep user account codes in the underground vault, absolutely inaccessible by the user support group.* This policy will guarantee that the user shall not operate during off hours should the poor slob forget the code.

I'm sure that if you follow these simple rules, adapting them to your particular environment, you will be successful, at least according to one installation's warped sense of performance.

Voyager II System Has Proven Its Value

The Taylor Report
By Alan Taylor CDP

"The computers have done everything we asked them to do, and Voyager II is going fine," was how Tom Draper of Caltech-managed JPL put it. He was echoed by National Aeronautics and Space Administration (Nasa) program manager Rodney Mills; "There has been a lot too much negative publicity about the computers and Voyager. They and the spacecraft are doing perfectly, and we have proved their value in space much more thoroughly than we ever expected." What, then, was the cause of the widespread publicity about a "mutinous" computer?

First of all, despite the claims that the computer worked perfectly at all times, there was a distinct computer problem that was really hardware-related. The memory was simply too small, so JPL used one register to store two functions. Owing to a previously known problem in the JPL designed Honeywell-produced Canopus star tracker, the functions interfered with each other, causing chaos.

This, however, did not occur until some time after the Voyager computers were first thought to be on the blink. The idea that the computers were doing something wrong arose almost immediately after the release of the spacecraft from the Titan rocket, when the Attitude computer suddenly switched from the primary control system to a standby one.

The switch was interpreted as suggesting that the Control computer had found something wrong in the Attitude computer. In fact, the Attitude computer was fine and remained so except for an initialization bug in the switch program.

Programming Bug

This particular programming bug occurred when the initialization routine for the standby computer simply duplicated the initialization routine of the primary Attitude computer — and forgot to pick up the latter's readings as to the current attitude of the spacecraft. Naturally, this caused some chaos later when they had to go through an unexpected series of 360-degree and 42-degree search maneuvers to find the sun. But the program to correct this error was right on the spacecraft, and it worked.

And there was a later programming bug involved in the resetting of a parameter at the end of a search cycle when the star Canopus is lost. The Canopus star tracker is really not a star tracker at all, it is JPL-designed bright spot tracker, which has earned its grandiose name from usable, although not perfect, performance on earlier space flights.

Bumps in the Night

The trouble is that the tracker cannot tell the difference between a dust particle passing over the sensor and the star Canopus (or any other star for that matter). It selects and tries to follow the brightest image around. That, fairly commonly, is a particle from the spacecraft itself.

When a group of particles passed over the sensor during the search sequence (i.e., after lock-on has been lost for some reason — probably another space-craft particle), the routine was set to increment the parameter by 0.04 each time a new particle was found. But at the end of the cycle, they reset by decrementing only once — which naturally did not work unless there was only one "bump" around. In fact, there were many. Now, this too has been fixed.

However, while a too-small computer memory and two fixable program bugs did occur, their importance was dwarfed by the noncomputer errors that were involved in the launch. If it had not been for the recovery power of the computers, the noncomputer errors could easily have ruined part of the mission if not all of it.

I don't think I have found all of the errors yet, but here are a few:

• Overloaded Gyros — The gyros were knowingly overloaded in the boost phase and naturally did not keep in perfect synchronization with each other. They even hit other parts of the craft during boost maneuvers. Again, this was done knowingly and caused no harm.

What did cause problems, however, was when the computer was not told of any overloads and was instructed to report whenever sets of readings from different gyros did not fall within reasonability limits set for cruise, not boost, conditions.

• Slow Valve Check — The thrust motors were turned off after the spacecraft was on its own so that a number of valves could be checked to see that they were not stuck and were in the right position. A check takes only a few milliseconds, but

(Continued on Page 20)

UMI

THE TAPE CARTRIDGE LINE:
800-528-6042

THREE PHOENIX COMPANY
10632 N. 21st Ave • Phoenix, AZ 85029

☐ **DRIVES**
Designed for O.E.M. applications.

☐ **COMPUTER PERIPHERAL STORAGE SYSTEMS**
Specifically designed for PDP-11's.

☐ **GENERAL STORAGE SYSTEMS**
Packaged as transceivers/general-purpose tape recorders.

☐ **TERMINAL PERIPHERAL STORAGE SYSTEMS**
Engineered for interfacing with terminals as part of the terminal system.

Systems on Voyager Should Get Credit

(Continued from Page 19)
only one valve was checked per second and for up to a minute all thrust motors were inhibited.

No one told the computers that the thrust motors were being inhibited or that normal reasonability checks were not in force. They therefore switched from one set of valves to another and from one set of electronics to another to try to keep the spacecraft on course.

The system suspected itself, and that is what caused the computer switch to the standby systems and started the rumors of the computer failue.

• Unchecked Frequency — The communications frequency of the spacecraft was sent to the tracking stations after Kennedy Space Center released control to JPL without being checked after a manual transcription had occurred. As a result, communications in real time were lost for about 20 minutes — just after the switching of the Attitude computer.

• Wrong Firing Calculations — The rate of jet firings during pitch maneuvers was incorrectly calculated as being well below 750 firings every five minutes. In fact, it was consistently above this and every time it went above, flags were set that prevented any sensitive-flagged sequence from taking place.

One such was the second attempt to lock the science-boom in place. This was properly aborted, giving rise to the "mutiny in space" idea.

The upshot of the matter is that the public is under the wrong impression. The insiders who know what was involved in the multiple-particle problem and the "mutiny in space" ideas are resentful of the press reports, thinking that writers jumped to conclusions, as one JPL spokesman told me they had.

In fact, the computers, while perhaps too small, may well have saved the Voyager II's mission. This is something that deserves public acknowledgement.

How about it, Caltech? JPL? Nasa?

© Copyright 1977 Alan Taylor. Reproduction for commercial purposes requires written permission. Limited numbers of copies for non-commercial purposes may be made provided they carry this copyright notice. The views expressed in this column do not necessarily reflect those of Computerworld.

QUICK DELIVERY

More Mini At Lower Cost Than DEC And Data General.

Interdata is ready to deliver and install a complete 16 or 32-bit minicomputer system with a totally integrated hardware-software package and a full complement of peripherals. Now, just plug it in and you're ready to run.

Field-proven workhorse. For just $33,500 you can get Pack/16, our powerful 6/16 CPU with Interdata's versatile multitasking operating system and extended FORTRAN, and Interdata's powerful library of utilities.

You also receive a 10 MB disk, 400 CPM card reader, 200 LPM line printer, and a Carousel 30 teleprinter terminal.

Big computer at a small price. Need the extended addressing features and powerful instruction set of 32-bit architecture? Order our Pack/32. For only $43,500, you get a 7/32 processor plus all of the peripherals and software mentioned above.

Send me 1977 specs on Pack/16 and Pack/32.

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

INTERDATA®
A UNIT OF
PERKIN ELMER DATA SYSTEMS
OCEANPORT, N.J. 07757 (201) 229-4040.

Service Bureaus Can
Increase Profits
(Protect your customer base)
(215) 363-8750
Infomark INC

PLEASE TURN PAGE

CCP a 'Cliquish Vanity' Emphasizing Education In Place of Real Ability

By Jeff D. Murphy
Special to CW

It is time to speak out. The world of the programmer is crumbling before our eyes, but we do not see it.

I refer to the destruction which awaits us at the hands of one-half of one percent of our own members. Specifically, I refer to the Certificate in Data Processing (CDP) and the Certificate in Computer Programming (CCP).

Computerworld tells us there are approximately 10,000 holders of either a CDP or CCP. The U.S. Department of Labor estimates the total number of programmers at 200,000 and growing.

Nearly every issue of *Computerworld* has someone pushing for the acceptance of the CCP as the standard, the proper measure of a programmer's worth. On the face of it, this sounds like a great idea — an educational value worthy of pursuit.

So worthy, in fact, that I wrote to the Institute for Certification of Computer Professionals for a copy of its most recent announcement and study guide.

But there are things not mentioned by the supporters of the CCP.

The first problem with the CCP test is the $75 testing fee. Why on earth is the cost so high? I am not receiving anything for my money but the opportunity to take a test — and, perhaps, if I pass, a certificate which presumably would be my passport to better jobs.

Second is the areas covered by the test. Most programmers are business programmers. I challenge the Data Processing Management Association to produce an advocate that can demonstrate that knowing Boolean alegebra or tree and plexus data structures will make an individual a better business programmer.

Crucial Knowledge?

And how many DP managers consider it important that their programmers are conversant with, as the study guide suggests:

D. Professional Ethics and Legal Considerations
1. Privacy.
2. Security.
3. Patents, copyrights, trade secrets.
4. Personnel practices.
5. Contracts (e.g. commercial, employment).
6. Human impact of computers.

The point is that there are areas in the test which have nothing to do with testing the effectiveness of an individual's programming ability.

Third is the choice of terms used by the study guide writers. I think I understand subroutines. But to pass the test I am to be familiar with;

B. Program Structures
•
•
•
4. Subprograms
a. Calling routines
b. Common area
c. Reentrant
d. Local/global variable
e. Open and closed
f. Parameter message.

Tell me: How many of you reading this have any idea what a "local/global variable" is? Or what "snapshots" refers to in debugging a program? The study guide has such terminology in abundance. (Perhaps that is because the industry has such terminology in abundance.)

The fourth problem deals with the approach to storage media, where the programmer should know:

1. Physical characteristics of primary and secondary storage (e.g. track, sector, read-write heads, volume, speed, access time, etc.).
2. Selection considerations.

Now, I know what tracks and sectors are. But on which machine? Am I expected to know their use on an IBM 370/158, an NCR 8250 or an Imsai 8080?

The peripherals are all different for these machines, and the access methods are different. If I am only to understand the terms, then why don't we classify them under a more cogent label, such as "Terms to Know"?

Safety Disturbed

All right, so I'm begining to reach a little. There is a great deal of information outlined in the study guide which *should* be required knowledge for programmers.

(Incidently, if you are beginning to wonder why I keep harping on the point that it is programmers who are being tested, rather than systems analysts or management, the name of the certificate is Certificate in Computer Programming. And it will be programmers who will be required to have it if it is ever adopted as an industry standard.)

And one can argue that we need to encourage educational facilities to systemize their instruction along these lines. I am referring to the information under "II. Principles and Techniques of Programming," which is very well thought in general.

To force the adoption of the CCP as a standard for data processors, however, is to disturb the safety of 95.5% of the DP world by substituting educational attainment for demonstrable ability.

So why don't we let the CCP remain what it is — a cliquish vanity that suggests elitism to the unitiated and makes money for its creators.

Murphy is marketing manager for CMI Systems, Inc., a software firm in Renton, Wash.

Reader Commentary

How to Create a WINNING PROPOSAL

. . . a step-by-step guide to proposal preparation

- **U.S. Government and Military proposals**
- **Commercial and OEM proposals**
- **R & D proposals**
- **Civil Project proposals**

"The best book on proposals ever written"

250 PAGES—FULLY TABULATED

How to create a WINNING PROPOSAL is a proposal methods and procedures workbook. It covers the entire proposal process from start to finish—giving detailed instructions on contents, structure and methods of preparation for both solicited and unsolicited proposals. "WINNING PROPOSAL" is so effective it is used by NASA, GSA, DOD, ERDA, HUD, HEW and other government agencies as an aid in proposal evaluation. It provides step-by-step instructions on:

- **How to organize** the proposal contents—what goes where in the management, technical and cost sections
- **How to develop** an effective "win strategy," mobilize the proposal team and control the input of various team members
- **How to analyze** and respond to RFP's, RFQ's and IFB's
- **How to cost-out** engineering, research, manufacturing and production projects
- **How to develop** (and use) task descriptions, manpower estimates and a work breakdown analysis
- **How to write** a winning technical section, a winning management section and a winning cost section
- **How to plan,** schedule and manage the entire proposal effort . . . *successfully!*

Government requirements are covered in an overview of the U.S. procurement network, how it works, and how you can increase your "win probability" in competing for prime and subcontracts. "WINNING PROPOSAL" also contains a list of both government and commercial information sources to assist you in your pre-proposal research efforts.

Copies are available from Mercury Communications, inc. $65.00 (pre-paid) includes 3-5 day delivery inside the U.S. In Calif. add $3.90 tax. For outside U.S. $76.00 (Int'l Money Order) includes air delivery. For multiple copy discount information, call 408/425-8444.

Mercury Communications, Inc.
730-S Mission St.
Santa Cruz, CA 95060

Now from Digital– a low-cost paper tape reader.

The PRSO1, Digital's new low-cost, portable paper tape reader for high performance terminals.

Now you can easily load your programs, bootstraps and diagnostics into any make or model of computer or terminal you currently own through an approved 20 mA interface. Available in 300 baud and 2400 baud versions, the small (12"x8") and light (3kg) (6.5 lbs.) self-contained unit can go just about anywhere you need an input device. All for a mere $750.

For complete information on the PRSO1, call your nearest Digital office; or write Digital Equipment Corporation, Traditional Products, 125 Northeastern Boulevard, Nashua, N.H. 03060.

digital

In Turning Esoteric to Understandable

Technical Writers Really Communicators

By Glenna James
Special to CW

"Low priority." "Hateful work." "What documentation?" Those might be some answers to a query on documentation in a typical DP environment.

Maybe DP needs more writers and maybe writers need to know more of what DP documentation expects.

As a novice tech writer just wrote in a letter asking for my help, "It seems to be an extremely esoteric subject." Yes, Virginia, so it seems. We confront fragmented and varied recommendations (volumes and volumes of it) when we study writing about systems today.

Programmer/analysts don't like to write narrative materials, standard formats never seem to fit and the job is tossed off to a writer who is bewildered because there is no one firm rule which fits all technical documentation tasks. Rarely is it done throughout an organization according to a precision standard procedure. Why?

Reader Commentary

Enter the human element. The documentation writer must translate or interpret before writing, therefore acting first and foremost as a communicator and grasping messages from the designer, the end user, the DP manager, the programmer/analyst and the operations personnel, not to mention the software and hardware manufacturers.

The writer must then translate and mesh all of these messages into documents to serve various levels of management and various levels of users. The technical writer, then, is translating probably five or six "languages" when these levels of human communications are considered.

Since the end product must address specific audiences, the writer must consider both source and interpretation to produce a meaningful, useful document. And added to that?

Enter style. Style, in technical writing, does not correlate to style as we think of it in creative or journalistic writing.

The most important element within a style as it pertains to technical writing is *clarity*. Keep it simple, concrete and, if procedural, active.

There is no such thing as *one* technical writing style. If we must decide on one, let it be elliptical — marked by extreme economy of writing. Procedures will be understood if they are brief, do not require interpretation and are easy on the eye. (Manual readers like a lot of white space.)

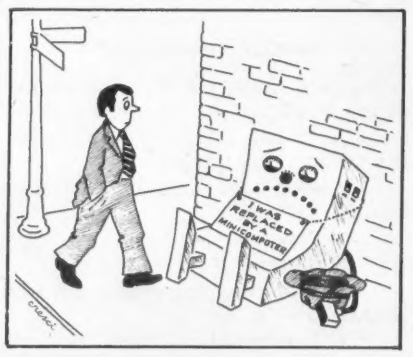
This is not to say that the documentation should be incomplete. Say it all, but in the least number of words and use simple words that are clearly understood.

Format? Use columns, blocks, matrices, bubble charts, flow charts, playscript, decision tables, narratives, graphics, outline and/or headline formats, Virginia, *if* they get your message across. Just as no one standard fits all documentation, one manual may use to advantage more than one format.

Last but not least, dear Virginia, learn to interpret all the mysterious terminology thrown around by this computer generation and translate it if your audience requires doing so. If you are writing for programmers, use their language.

But remember, the user is not a programmer. When in doubt, spell it out. Index the simplest of the acronyms in the back of the manual you write.

Technical writers still abound; they're just called communicators.



In the last 50 head to head competitions between DATACOM/DB and the 5 other leading DBMS vendors...

DATACOM/DB was bought 34 times... the clear choice by over a 2 to 1 margin!

You'll never be less than "State of the Art" with DATACOM.

Here's why DATACOM delivers more for your money: Easiest-to-use in design, implementation and maintenance of application systems □ Best on-line performance for inquiry and/or update transactions under DATACOM/DC (our superior telecommunications monitor), CICS or other monitors □ Unequalled sequential processing capabilities □ Minimum use of 360/370 hardware resources including CPU cycles, memory, I/O events and DASD space □ Exceptionally readable and usable documentation □ Continual, innovative, cost-effective enhancements. Call or write today. Let DATACOM prove why it's the "2 to 1 choice" among professionals.

I want you to prove DATACOM/DB "2 to 1" superiority on 360/370 systems.

Name Title

Firm Phone

Address

City State Zip

DATACOM/DB and DC are made for each other...and you.

insyte datacom corporation

214/526-4280
3707 Rawlins St. Dallas, TX 75219
San Francisco/Chicago/New York/Denver/Mexico City/Frankfurt, W. Germany

Make A Killing

with our mini

(Before someone else's mini makes a killing of you)

(215) 363-8750
Infomark INC

PLEASE TURN PAGE AGAIN

Study Planned On DBMS

NEW YORK — The American Institute of CPAs, along with the Canadian Institute of Chartered Accountants and the Institute of Internal Auditors, have launched a joint project to conduct research on the audit impact of data base management systems (DBMS).

The final report from the task force responsible for the project is not expected to dwell on explicit features of individual DBMS, although it may use some as examples of more general points.

The task force is planning to hire the services of a full-time researcher for one year. The position requires a person with a computer auditing background, a thorough knowledge of DBMS and an understanding of research methodology.

Persons interested in the position should send a description of their qualifications to Paul Levine, manager, Practice Applications, American Institute of CPAs, 1211 Ave. of the Americas, New York, N.Y. 10036.

Fortran IV One Highlight Of IBM 34 Enhancements

ATLANTA — Fortran IV, a Job Analysis System and on-line application systems for distributors and manufacturers were among the software offerings announced by IBM with its recent introduction of System/34 enhancements (see story on Page 49).

Fortran IV, scheduled for release next July, significantly extends the repertoire of languages available to the users of these small systems. Previously, the options were limited to RPG-II and Basic Assembler, a spokesman acknowledged.

Job Analysis System/34 (JAS/34), also set for release next summer, is "sort of a project management tool," he said, adding that it allows the user to plan for almost any type of project susceptible to Critical Path Method (CPM) analysis.

Fortran IV will carry a monthly license fee of $100, while JAS/34 will cost $68/mo.

Accounting System

The Distribution Financial Accounting System II (DFAS II) was introduced to assist its target users with on-line support for general ledger, accounts and payroll applications. The programs complement the previously announced Distribution Management Accounting System II (DMAS II) that handles billing, inventory control, accounts receivable and sales analysis.

The DFAS II modules should require no programming modification by the user, IBM said.

DFAS II modules are separately priced. Accounts payable and general ledger cost $35/mo each and the payroll module has been pegged at $47/mo.

The Manufacturing Accounting and Production Information Control System (Mapics) provides ready-to-use programs for 11 application areas incuding order entry and invoicing, inventory management and accounts receivable. Other areas are general ledger, accounts payable, payroll and product data management.

The final application areas supported by Mapics are material requirements planning and production control and costing. The software also provides data collection system support, IBM noted.

Each of the modules is separately priced with monthly license fees ranging from $35 to $90 each. All will be released in the period from November through February, according to present plans.

Interdata Updates OS/32 MT

OCEANPORT, N.J. — An enhanced version of the OS/32 MT operating system and a separately priced Multi-Terminal Monitor (MTM) software option that works with the update have been announced by Interdata for use with the company's 32-bit CPUs.

The Dynamic OS/32 MT supports multiprogramming with up to 255 user tasks written in Fortran, Cobol, Basic or Assembly language. It includes a real-time executive for resource management, task scheduling, roll-in/roll-out and subsystem management, a spokesman said.

File management with device-independent I/O and support for temporary files as well as spooling of both input and output are also built into the Dynamic OS release.

The resource management capability includes support for dynamic allocation of main memory instead of the partition approach used in earlier releases of the software.

The subtasking capability includes the creation of subtasks and segmentation of programs into "pure' and "impure" parts. The pure segments are those portions made up of reentrant code.

The spooling facility reads card images onto disk, on the input side, and writes printer images on disk, after which they are moved to the printer as it becomes available, on the output side of the operation.

Entire reports are spooled to disk before any printing is started, Interdata said. This delays the start of print runs, but means extra copies of reports can be made as needs arise.

The MTM option supports up to 16 concurrent on-line program development terminals and 16 background batch tasks. This means the OS/32 MT user now has remote job entry capability.

MTM includes an accounting mechanism which records system usage. An accounting program is available to provide reports of that use, the spokesman noted.

Dynamic OS/32 MT for either the 7/32 or 8/32 systems costs $5,000, which includes one-year paticipation in Interdata's Software Subscription Service. The MTM option, which requires the updated operating system, costs an additional $2,500.

Interdata is at 2 Crescent Circle, Oceanport, N.J. 07757.

Basic Available For IBM Series/1

BIRMINGHAM, Ala. — Basic/1, an interpreter developed by Graham Computer Enterprises, Inc. (GCE) for the IBM Series/1 minicomputer, is said to offer the features defined in the American National Standards Institute (Ansi) proposed standard for minimal Basic, which was released for comment last December.

In addition, however, Basic/1 provides many extensions to that proposed standard, paticularly in the area of file processing, character string manipulation and output formatting, GCE said.

Files can be created, deleted or renamed within Basic/1 programs and can be accessed sequentially or randomly. The initial re-

(Continued on Page 25)

IF YOU'RE MAKING FINANCIAL DECISIONS WITHOUT TIMELY INFORMATION, YOU NEED THE MMS GENERAL LEDGER.

When your financial management makes decisions without accurate, timely information, they might as well be blindfolded.

But you can give your decision-makers *all* the information they need, in *any* format they feel comfortable with, and deliver with fast-ball speed.

All you need is the MMS GENERAL LEDGER. The proven financial reporting system, it's scoring an impressive record in more than 800 major corporations around the globe.

A data-base system, MMS GENERAL LEDGER knows how to handle all the league-leaders, including DOS, O/S, IMS, IDMS, DL/1 and TOTAL.

If your requirements need a heavy-hitter, the MMS GENERAL LEDGER is available with an additional *ON-LINE MODULE* that makes financial reporting a whole new ball game.

Best of all, MMS GENERAL LEDGER is only one member of Software International's all-star team, which features Accounts Receivable, Accounts Payable, Net Change MRP, Filetab Report Writer and three for Systems/3 — General Ledger, Accounts Payable and Accounts Receivable.

When the pressure is on and you can't afford mistakes, call or write Software International. Get the champion performer, MMS GENERAL LEDGER.

Take me out to a whole new ball game of financial reporting. Please send me more information about:

☐ MMS General Ledger
☐ MMS Accounts Payable
☐ MMS Accounts Receivable
☐ Net Change MRP
☐ Filetab Report Writer
☐ S/3 General Ledger
☐ S/3 Accounts Payable
☐ S/3 Accounts Receivable

Name _____ System _____
Title _____ Phone _____
Company _____
Address _____
City _____
State _____ Zip _____

SOFTWARE INTERNATIONAL*
Elm Square, Andover, Mass. 01810 (617) 475-5040

*Registered Trade Mark of Software International Corp.

New York (914) 332-0040 Washington, D.C. (301) 770-6460 Philadelphia (302) 995-7101 Chicago (312) 729-7410 San Diego (714) 292-9833 Toronto (416) 862-0521 Houston (713) 444-3348 Columbus, OH (614) 773-2167 San Francisco (415) 433-5797

Data Administrator Duties Differ From DBA's

By Stephen L. Robinson
Special to CW

In a recent Data Base Corner [CW, July 25], I started a discussion of the differences between the responsibilities of a data administrator and those of a data base administrator (DBA). In this column, I'll go into more detail on the concepts of data administration.

Data Base Corner

Without muddling the terminology maze further, the most descriptive title I have heard for the data administrator's position (employed at General Foods, Toronto, among other places) is "manager of data resources." One of my colleagues, Arvind Shah of Performance Development Corp. (PDC), suggests the term "data controller," since the data administrator is to corporate data what a controller is to corporate finances.

Whatever the title, the data administrator is responsible for establishing, monitoring and, when necessary, modifying an organization's policy for data gathering and utilization. This responsibility transcends functional boundaries (a fact that argues against the establishment of a data administrator in many organizations).

Yes, but what does the data administrator do?

In approximate chronological order, the data administrator:

- Takes inventory of existing data collection, storage, maintenance and utilization.
- Builds a model of the relationships between the data elements which exist.
- Analyzes data/information requirements of the organization as a whole.
- Builds a model of the relationships between data elements which would reflect actual requirements, not existing systems.
- Develops a plan to evolve from the existing systems to an implementation of the second model.
- Works with the data base administrator to make it happen.

In the rest of this column, and in subsequent columns, I shall expand on each of these tasks.

Taking Inventory

In two columns last spring [CW, May 23, 30], Bob Chamberlain, a colleague of mine at PDC and CACI, Inc., described information flow analysis (IFA), the inventory taking process. I direct the reader to his columns for an overview of the IFA process and rationale. Rather than duplicate Chamberlain's efforts, I will summarize some of the key points and then delve into some of the nitty gritty.

Briefly, an IFA (which should probably have been called a DFA, or data flow analysis) is a complete study of existing data acquisition, maintenance and processing. This means:

- Identifying all data points of entry and cataloging the media by which the data is recorded.
- Tracking the media through an organization, noting where it is copied, where data/information is extracted, where changes can be made, where deletions can occur, etc.
- Observing and recording the creation of new media which carry data/information, e.g., reports.
- Following these new media, treating them as above.

With wisdom borne from numerous IFAs, the following is a recommended set of procedures;

- First, begin a study of data dictionary packages, or, if you have programmers/analysts who aren't doing anything, build your own data dictionary package. As should be evident from the brief description of an IFA, a lot of data about data is generated by this study. The sooner you have a tool on hand to store the data and analyze it the better.
- Begin your inventory with a well-documented area. Typically, this might be forms, files or reports. Experience dictates that entry forms are a good place to start (unless they are not well documented). The main things you will want to document for a data entry form are form name/number, data element names, formats, and flow history.

For the flow history, draw a "flow" chart with a "node" to represent every place something significant can happen to the document such as data extraction, form duplication, data changes, etc.

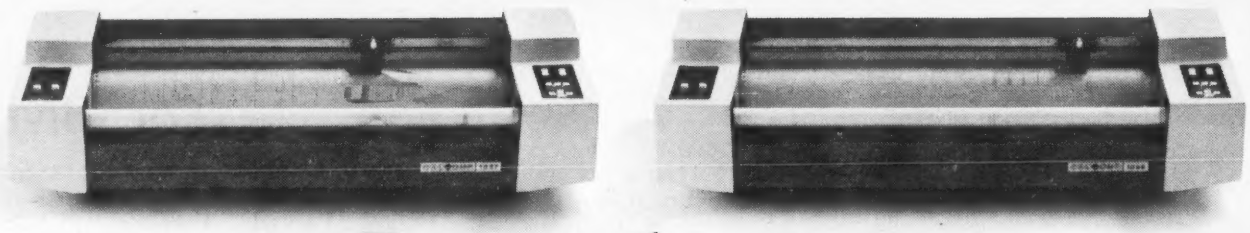
In addition, you may want to document other information about a form. This could include frequency of use, form supplier, storage locations, privacy/security criteria, etc.

- For automated files you will want (in addition to the above) record formats, storage algorithm for records, file names, backup file names, log names, etc.

(Continued on Page 25)

Become A
Distributor For
DMS 24
Mini-based Management Information Systems
(You've got to know the territory)
(215) 363-8750
Infomark INC
... AND AGAIN

CalComp means



Introducing a new

CalComp innovates. Again.

This time with an all-new line of intelligent drum plotters.

Want performance? CalComp's new line comes through with the smoothest line quality output in the industry.

Want value? CalComp's new line delivers with price/throughput ratios second to none.

Want selection? CalComp's new line gives you greater freedom of choice with a total of four distinct models.

It all adds up to unbeatable performance, unprecedented value and the broadest line of drum plotters available.

Anywhere.

The world's best performance.

For greater accuracy, all four new models—including their pen actuators—are d.c. servo-motor driven.

This, combined with "smarter" microprocessor-based controls, means faster, more precise plotting in every application.

Once again, CalComp sets new graphics industry standards for throughput and output performance.

New plotting world facts.

plotter model	inches-per-second	pens	step size
1037	2.0	1	.002
1038	4.5	1	.002
1039	4.5	3	.002
1051	10.0	4	.001

Superior penmanship.

Penmanship, too, is unexcelled in each of these four new drum plotter models. Thanks to CalComp's special linear drive pen mechanism.

This newly designed linear drive creates consistently superior line quality by promoting greater pen force control.

You also get the industry's fastest pen-up/down time and fastest throughput. With matching CalComp-quality output.

What's more, CalComp offers plotter-compatible pens for every requirement. Pressurized ballpoints. Liquid inks.

M6800 Cross-Compiler Bows

CAMBRIDGE, Mass. — PL/-M6800 is a cross-compiler from Intermetrics, Inc. that uses the facilities of an IBM 370 to create optimized, directly loadable object code and program listings for execution on a Motorola M6800 or AMI S6800 microcomputer.

The language source is syntactically identical to Intel Corp.'s PLM, according to a spokesman, but the object code produced is "highly optimized" since the compiler has enough room in the 370 environment to take advantage of nearly every instruction in the microprocessor.

PL/M6800 provides a user-controlled switch that determines whether the generated object code is in the AMI or Motorola loader format. Other user options include the preparation of source code, object code or equivalent assembler level code as well as symbol table dumps, the spokesman noted.

Microprocessor users who want to use the capabilities of PL/M6800, even though they normally have no access to a 370 for the purpose, will find the cross-compiler on both the National CSS, Inc. and General Electric remote computing networks, he continued.

Otherwise, the software is packaged and available for a purchase cost of $1,000, which includes a magnetic tape containing a copy of the cross-compiler and all associated library routines, a user's manual, language reference manual and product maintenance for a year.

Intermetrics is at 701 Concord Ave., Cambridge, Mass. 02138.

Data Administrator Leads Organization Into DBMS

(Continued from Page 24)

• Extend your study beyond the computer room. Typically, substantial data/information never finds its way to the computer. Starting with entry forms should avoid the trap of making this just a DP study.

• Enter your "meta-data" into a data dictionary.

• Resolve (identify and record) synonyms. They come in several flavors; data elements with the same name and same meaning; data elements with the same name and different meanings (watch out for these); and data elements with different names and the same meaning.

• Analyze data flows. You will probably identify the source of some of your information problems (e.g., unsynchronized maintenance). Fix these.

You have now demonstrated the value of data administration to management and are now ready for bigger and better things.

Robinson is an independent consultant. S.L. Robinson & Associates is in Morrisville, Pa.

Basic Available On IBM Series/1

(Continued from Page 23)

lease supports files on diskette only; disk file support will be available later this year, according to a spokesman.

Character strings controlled by Basic/1 instructions may range up to 255 characters, he added. Output formatting is provided in the PRINT USING statement; a PICTURE-type format is specified so formatting of a print line is "relatively simple," he said.

Both floating-point and integer numeric variable data types are allowed. Both types have ranges comparable to the double-precision ranges of the Series/1, the spokesman claimed.

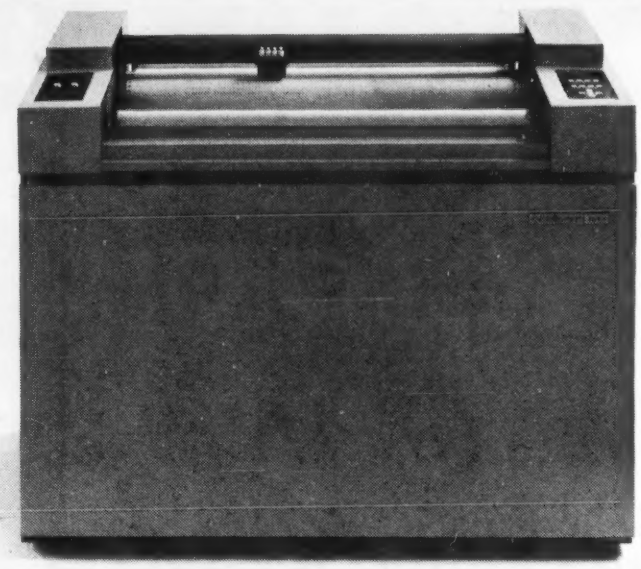
Clause Addition

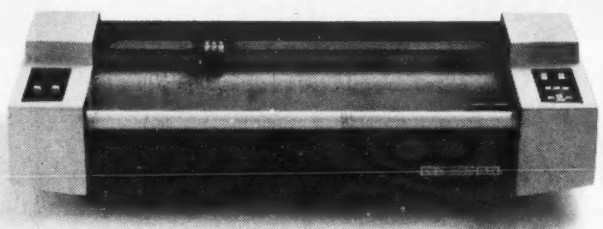
Another extension beyond the proposed Ansi standard for minimal Basic supports the addition of the ELSE clause to the IF statement. Programs can use multiple statements after the IF . . . THEN . . . ELSE construction, GCE noted.

License fees for the single-user diskette-based version now available is $1,800 per CPU. This fee can be applied as credit toward the purchase of the single- or multiple-user disk-based versions when they become available.

GCE is at Suite 106, 3 Office Park Circle, Birmingham, Ala. 35223.

plotting.





world of drum plotters.

Plastips. All in a wide variety of colors and widths.

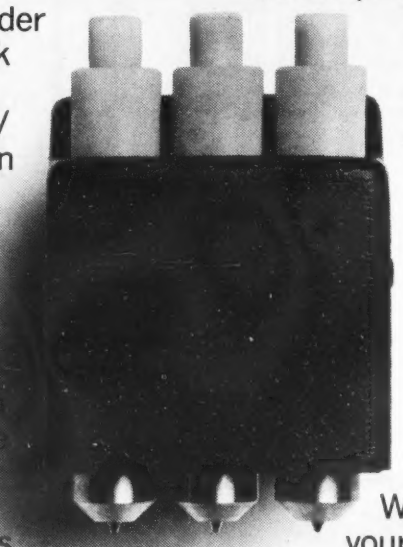
Our no-modes-barred approach to plotting.

CalComp is the world leader in computer graphics. So pick the mode of plotting that's right for you: on-line, remote/timesharing or off-line. We can easily adapt.

Let us expand the versatility of your calculator or minicomputer with on-line graphics capability and our software.

Or, let us show you how to reduce transmission line time with a low-cost, high-quality CalComp solution for your remote/timesharing problems.

Whatever your mode—whatever your application—you're sure to find a new CalComp configuration that's a perfect match. Because, quite simply, there isn't a broader, more versatile line of intelligent drum plotters in the world.



The CalComp edge.

Service and support—worldwide and second to none—keep CalComp ahead of the competition even after the sale.

It's the industry's most extensive support network. In terms of both field service personnel and in-place field systems analysts. Another example of CalComp's dedication to excellence in all phases of the graphics business.

Our edge in experience is proven by the world's largest installed base of graphics systems and more than two decades as the world leader in computer graphics systems.

We'll prove we're better. Contact your local CalComp sales representative for a sample of our work. Seeing is believing.

CALCOMP

Dept. CWS, 2411 W. LaPalma Avenue
Anaheim, CA. 92801, (800) 528-6050, Ext. 115

EDP Managers:
Datapro can teach your new users to speak your language in three days

Our non-technical seminar can help you introduce the management and staff of new user departments to the concepts of DP, and show them how to start effectively using your department's resources.

At your place...
Fixed fee presentations in your facility

...or ours
Individual enrollments open for
• New York: October 26-28
• San Francisco: November 2-4
• Washington: Nov. 30-Dec. 2
• Chicago: December 12-14

for
FREE COURSE OUTLINE
and full schedule of EDP seminars, call
800-257-9406

datapro
1805 Underwood Blvd., Delran, NJ 08075
In NJ, call 609-764-0100

CPEUG To Blend Technical, Managerial Topics

By Don Leavitt
CW Staff

NEW ORLEANS — The 13th meeting of the Computer Performance Evaluation Users Group (CPEUG), hosted by the U.S. Department of Agriculture, will be held Oct. 11-14 at the Fountainbleau Hotel here and all interested people are welcome, according to program chairman Dennis M. Conti of the National Bureau of Standards (NBS).

Founded in 1971 by the U.S. Air Force and now sponsored by NBS, CPEUG provides a forum for DP professionals actively involved in improving the efficiency and effectiveness of computer facilities.

Although the group has its roots in the federal government, it welcomes participation from the private sector.

In common with many performance-oriented conferences, this meeting will include workshops focusing on user experience with measurement, optimization and simulation tools and techniques. Vendor presentations will provide insight into current products.

Last year's major innovation — discussions of management-oriented issues — has been integrated directly into the main line of the CPEUG '77 program. Tutorials in performance fundamentals — another innovation last year — will be back again this year, Conti noted.

This year, CPEUG will experiment with a program structured around the three phases of a DP project's life cycle. The first afternoon's sessions will relate generally to the requirements phase of a project and will concentrate on workload definition.

The second day, concerned with the acquisition part of a project, will cover computer system acquisition in the morning and on-line system evaluation in the afternoon.

Sessions on the third day, centered on performance measurement in the morning and prediction methods after lunch, will be most pertinent to the operations phase of a project. The conference will adjourn early the next day after a discussion of future DP systems.

Keynote speaker this year will be A.G.W. (Jack) Biddle, president of the Computer & Communications Industry Association. Session chairmen will include Terry Potter from Bell Labs, Norris Goff of the Department of Agriculture and Thomas F. Wyrick of Fedsim.

Registration fee for the conference is $40, payable in advance (until Sept. 30) or at the door. Checks made out to CPEUG should be sent to CPEUG, c/o U.S. Department of Agriculture/Nocc, P.O. Box 60900, New Orleans, La. 70160.

Independent Has Sort For Interdata Minis

DEARBORN HEIGHTS, Mich. — An independently developed sort package for Interdata 32-bit systems, Kimsort from Northware is up to five times quicker than competitive Interdata sorting routines, according to the vendor's claims.

Kimsort is a disk-oriented sort for use with Ascii or Ebcdic files that supports both ascending and descending sequencing on "virtually any number" of key fields, Northware's spokesman said.

Although it can be used in stand-alone batch or interactive operations, Kimsort can be treated as a callable subroutine from Fortran, Cobol or Assembler language application programs.

The package also provides a facility for blocking/deblocking of magnetic tape and contiguous disk files. This is a feature not currently provided by Interdata-supplied software, according to Northware.

Kimsort costs $500 and is available now from Northware through P.O. Box 363, Dearborn Heights, Mich. 48127.

'Polaris' Eases Writing Of IBM 32 RPG-II Code

DENVER — The Polaris package from Polar Dynamics, Inc. allows the user of an IBM System/32 to generate RPG-II programs from a single key-word-oriented coding form.

The user need be neither a skilled programmer nor high-level computer expert, but should have a basic knowledge of the hardware, a spokesman said.

The user still has to "tell" the system the input with which it has to work, what output is desired and what logical processing is required, but the single coding form is much simpler than the "half dozen or so" sheets normally used in creating RPG-II programs, he said.

The software is available in both a basic single-file version and a more complex one to work with multiple files. Both versions support record selection by user criteria, file merging and creation, file updating and report generation, the spokesman added.

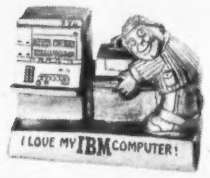
Once the Polaris parameters are entered, the system proceeds without further operator intervention through a compilation and, if the user wishes, an attempted execution of the generated program.

Already installed at several user sites, Polaris costs $1,500 for the single-file version and $2,000 for the multiple-file implementation.

Polar Dynamics is at Suite 203, 5777 E. Evans Ave., Denver, Colo. 80222.

DMS 24 Systems Are
Field Proven And Complete
Turnkey Systems include hardware, applications packages, documentation, training and service
(Just push the buttons to go)
(215) 363-8750
Infomark INC
ONE MORE TIME, PLEASE

COMPUTER STATUES



Choose from our four models IBM 370, NCR Century, System/3 . . . or a "plain" model which represents any other computer. Gold-finished, 6 inches long, perfectly detailed plaster sculptures. $6.95 each, post-paid. Satisfaction guaranteed. Brian Productions, 2949 Southfield Rd., Xenia, Ohio 45385.

EAST/WEST COMPUTERS, INC.
175 So. San Antonio Rd., Los Altos, CA 94022
Specialists in IBM Periphals
Buyers & Sellers of:
3420 Tapes
3330 Disks
3830 Controllers
3270 Display, Controllers & Printers
Purchaser of IBM Rental or User Owned Equipment
In the East: Duane R. Tebo (215) 628-4040
In the West: Robert S. Pearson (415) 941-9164
Member Computer Dealers Association

STILL DOWN IN THE DUMPS?
Tired of 'Hex-erratic' calculations?
Want the answers to your problems in English?
Spend your time correcting the problem,
Instead of trying to find it.
Abend-AID has been helping users get out of the dumps for almost three years.
Contact the 'Dump People' and learn how to save time and money by using Abend-AID.
Abend-AID REPLACES CORE DUMPS WITH INFORMATION.
For all OS/VS/MVS Systems
TOMARK, INC.
5645 BEACON HILL DRIVE
CLEVELAND, OHIO 44131
(216) 585-5672

UNIX
SUPPORTED
at last
UNIX for time sharing
UNIX for programming
UNIX for text processing
UNIX for typesetting
complete UNIX systems and services
by
Interactive Systems Corporation
Peter G. Weiner, President
1526 Cloverfield Blvd., Santa Monica, CA. 90404 (213) 829-7741

YOU'RE GOING TO SEE A SMALL BUSINESS SYSTEM DO THINGS IN A HOTEL ROOM YOU NEVER THOUGHT POSSIBLE.

The computer that's causing all the excitement is the CS/40 Small Business System. The multi-terminal, interactive COBOL, upgradeable, low cost business system from Data General. Learn how Data General's Commercial System CS/40 can make money for **business system suppliers** and save data processing users time and money.

Attend one of our A.M. (9-12) or P.M. (2-5) sessions.

Return the coupon or call the local Data General office listed for reservations.

- New York (212-557-1122) Sept. 27, 28, & 29th ☐
- Philadelphia (215-643-5515) Oct. 4, 5, & 6
- Chicago (317-885-0505) Oct. 11, 12, & 13
- Atlanta (404-325-3181) Oct. 18, 19, & 20
- Dallas (214-233-4496) Nov. 1, 2, & 3
- Los Angeles (213-973-0401) Nov. 15, 16, & 17
- San Francisco (910-372-6668) Nov. 29, 30, & Dec. 1
- Washington (703-893-0910) Dec. 13, 14, & 15
- Boston (617-235-8171) Jan. 10, 11, 12

☐ Yes, I want to attend. I'm interested in the seminar

_____ on _____
location date

Name _____ Title _____

Company _____ Department _____

Address _____ Phone _____

City _____ State _____ Zip _____

☐ I can't wait for the seminar, please send information on the Commercial Systems CS/40.

CW 926

Data General

It's smart business.

Data General, Westboro, MA 01581, (617) 366-8911. Data General (Canada) Ltd., Ontario. Data General Europe, 15 Rue Le Sueur, Paris 75116, France. Data General Australia, Melbourne (03) 82-1361.

'SCSS' Supports On-Line Statistical Procedures

CHICAGO — The SPSS Conversational Statistical System (SCSS) from SPSS, Inc. is described as a fully conversational statistical and tabulation system for users of IBM's Time Sharing Option (TSO) on 360/370 mainframes.

The software was designed for files with many variables and up to "several thousand" records, according to a spokeswoman.

SCSS includes six major procedures. Frequency tabulations, n-way cross-tabulations and descriptions of subpopulations including means, sums, standard deviations and variances are featured, she said.

Correlations and partial correlations are also part of the package, as is multiple linear regression with forward, backward, true stepwise and direct solution methods.

The system's functions are triggered by user responses to questions. The user can select one of three styles of prompting — verbose, normal or terse — or escape the prompting sequence entirely and preemptively specify answers to the questions, allowing a complete set of results with each user command.

Whenever a user is unsure of what a question means or what answer would be most appropriate, a HELP command provides a complete explanation, the spokeswoman noted.

The system is fine-tuned in its operation through the use of several variables, she claimed. The user may create new variables from existing ones by writing Fortran-like statements, she noted.

SCSS can be used in conjunction with the original batch-oriented SPSS package.

Currently implemented in IBM OS and OS/VS environments, SCSS is also being adapted to other systems and other mainframes. A VM/370 version designed for use with the Conversational Monitor System (CMS) is expected in November.

SCSS can be licensed for $4,000 annually, with discounted prices available for tax-exempt and academic organizations. SPSS, Inc. is at Suite 1234, 111 E. Wacker Drive, Chicago, Ill. 60601.

Package Spools 3/12 Print Files

SANTA ANA, Calif. — Users of IBM 3/12s can spool printer output to temporary disk storage if they have the Spool/12 software and a printer from Business Systems Technology (BST), according to the vendor.

By providing an access route to the disk storage and then from there to the printer, Spool/12 is said to increase throughput by 25% or more.

An interrupt-drive routine, the package is described as identical in operation to the Spool/8 and Spool/10 packages BST still offers for other models of the IBM 3 line.

In addition to overlapping process-bound operations, Spool/12 enables the user to control the printing operation itself. Through commands entered on the CPU's data/-address switches, printer output can be temporarily halted, cancelled or repeated in its entirety, a spokesman said.

The package does not require either IBM's dual programming support nor a console typewriter. It requires at least 5.5K bytes of memory and a BST 1,200-, 750, 550- or 400 line/min printer. Either BST or IBM disk drives can be used with the program.

Spool/12 rents for $99/mo, but lease plans of one- two- or three-years and purchase plans are also available, according to BST.

The company is at 3015 Daimler St., Santa Ana, Calif. 92705.

Operating System Links OP-1 Programmable Units

WOODBURY, N.Y. — Four OP-1 user programmable terminals from Ontel Corp. can be attached to and share a disk storage system if the configuration is supported by Ontel's "hard disk" operating system (HDOS/80), according to the firm.

The system supports a named file structure including dynamic allocation/deallocation of disk space. Sixty-four private user file catalogs as well as a single share catalog can be supported, Ontel said.

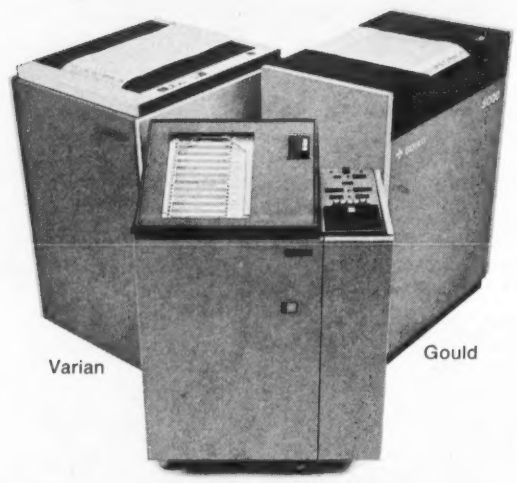
The system also includes a device-independent I/O subsystem, according to a spokesman.

Under the file system, the users can work with read-only shared files or with read/write access including lockouts at the record level to avoid updating conflicts, he said.

Utility routines packaged with HDOS/80 include facilities for file copy, delete, rename, print and erase operations and a program editor.

The entire operating system package is free to users of Ontel's terminals, the company noted from 250 Crossways Park Drive, Woodbury, N.Y. 11797.

If you own one of these



Versatec

get sensitive.

You pay plenty for electrostatic paper.
You should know about our new paper
that makes brighter images and costs less.
Try a roll free. Come with the
Sensitive Paper People.

GRAPHIC CONTROLS
COATED PRODUCTS DIVISION

sensitivity coupon

Send one free roll or fanfold to fit:
□ Gould, □ Varian, □ Versatec

Annual Usage: _____ rolls Paper Number_____

Name _____ Phone_____

Firm _____

Address _____

City_____ State_____ Zip_____

Mail to Coated Products Division, Graphic Controls Corporation, P.O. Box 1309, Buffalo, NY 14240

Or call toll free 800-828-7978.
(In New York State, call 716-847-7500.)

CW10

One Of
Your
Customers
may have a minicomputer system soon.
(Maybe you should be the one to sell it to him)
Call us now and
we'll tell you how.

Infomark INC
319 North Pottstown Pike
Exton, PA 19341 • (215) 363-8750
THANKS FOR STAYING WITH US

REMOTE BATCH PROCESSING
ON IBM'S FASTEST CPU
360/195

TIME FOR SALE

GUARANTEED
TURNAROUND
only
50¢ a second

OS/MVT, HASP/RJE, 2 Meg, 3330's and 2314's — United Airlines operates a **Cost Efficient** service featuring **High Speed Processing** and **Quick Turnaround.** Through **Auto Answer WATS** or leased lines (at speeds of 2000 to 9600 BAUD) you gain access to one of the most complete data centers in the United States.

Dial our number and execute your own programs or utilize a wide range of software — ICES, MARKIV, OSIRIS, BMD, PANVALET, GPSS, HEC1, HEC2, SWMM, all standard compilers and more.

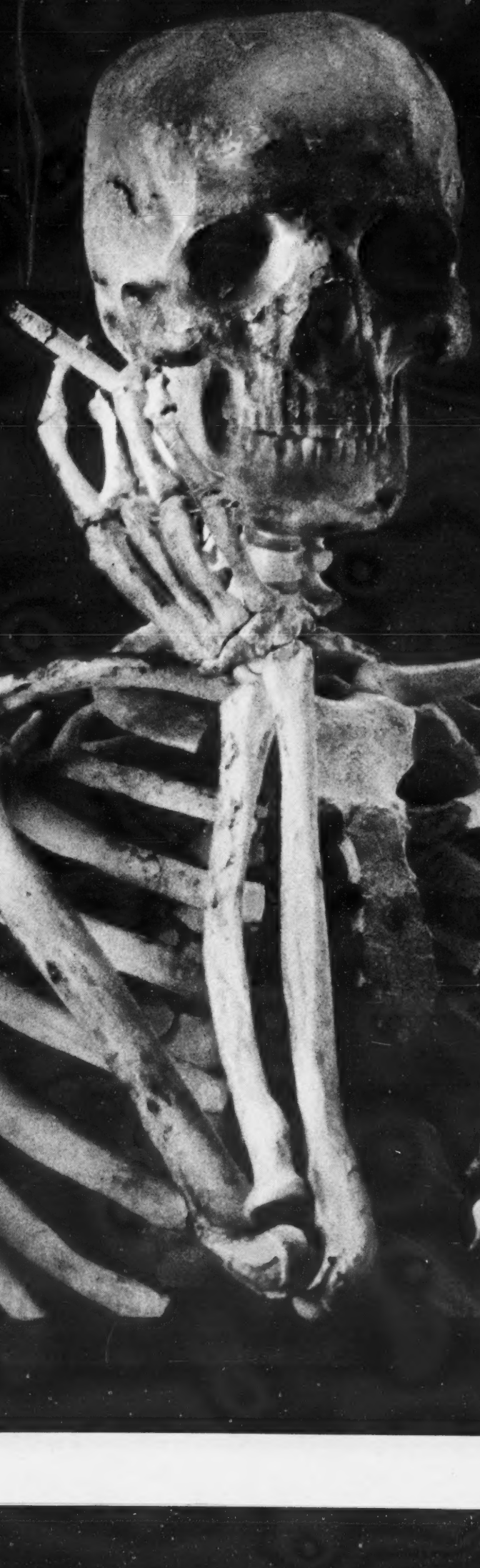
If you are using an outside computer service, United can offer you a substantial savings and an unbeatable service.

COMPARE — call or write today to request a benchmark or additional information.

UNITED AIRLINES

Computer and Communications Services Division
Denver Technological Center
5350 South Valentia Way
Englewood, Colorado 80110
Call Collect (303) 779-2000 — Ask for Jon Burley

TIRED OF WAITING FOR REPORTS?



With EASYTRIEVE, there is no need to wait for reports. In a matter of moments a program can be coded in English and run to provide exactly the information you require in a report you can read. EASYTRIEVE does the formatting, the figuring, the selection of just the data you need. Automatically. Quickly.

You don't have to be a wizard to learn to use EASYTRIEVE. Auditors, financial directors, secretaries, and other non-DP people use it every day. Yet, EASYTRIEVE is powerful enough to do systems housekeeping, create test data, do job accounting and forecasting. The system does multifile processing, print jobs, mailing labels, bar graphs and more. EASYTRIEVE accesses most DBMS files as well. And all without coding forms, extensive training or high overhead.

EASYTRIEVE is one of several valuable software solutions for the IBM 360/370 environment provided by Pansophic, the leading software company dedicated to solving your software problems. Call or write today for further information on our complete line of proven software products.

PANSOPHIC

709 Enterprise Drive • Oak Brook, IL 60521

East (703) 821-8370
Central (312) 986-6070
West (214) 233-0486

Member SIA Software Industry Association

V 1 1 3 9 SEP 26 77 UMI

IN THE SOUTHWEST, 645,000 NEW SQUARE FEET ARE READY TO GIVE YOU A HAND.

We grew 320,000 new square feet in Phoenix, Arizona...

...while growing 325,000 more in Albuquerque, New Mexico.

In the beginning of 1976, Digital's manufacturing facilities totaled about 3.4 million square feet.

By mid-77, they totaled over 5.5 million square feet.

We grew 2 million feet in a year and a half. We responded to the tremendous demand for our products.

New additions included 893,000 square feet in New Hampshire; 645,000 in Phoenix and Albuquerque; and 245,000 in Massachusetts. Plus another 400,000 square feet in other spots around the country and around the world. All up. All working. Now.

What it means when you add it all up is that you can look to Digital for "Now Delivery" on the great majority of Digital products. And it means that Digital equipment—always in demand—is a lot closer to being always in supply. And it means that we are ready to respond to customers who need to plan on delivery—now and later.

We built the capacity.

Let us give you a hand.

Digital Equipment Corporation, PK3-M18, 129 Parker Street, Maynard, Massachusetts 01754. (617) 897-5111, ext. 8614. European headquarters: 12, av. des Morgines, 1213 Petit-Lancy/Geneva. Tel: 93 33 11. In Canada, Digital Equipment of Canada, Ltd.

NOW DELIVERY. FROM DIGITAL NOW.

digital

With Distributed Processing

Protocols Key to Communications Future

By Arthur Lynch
Special to CW

The advent of distributed processing networks and use of data communication as a medium for sharing processing resources has created a need to easily communicate via phone lines between remote processing systems or, more specifically, to communicate between remote operating systems.

This gives a computer user in one location direct access to the resources of a processor at another location. There are many ways this capability can be used. Some typical ones are:

- Remote job entry (RJE).
- Access to various service bureaus via a data link.
- Sharing or accessing remote data bases.
- Providing data to a remote processor.

There are two necessary requirements for implementing this capability— the hardware to interface and control a data modem and a line protocol to control the data transfers.

Vendor	Interactive Terminal Protocols	Batch Terminal Protocols
IBM 360/370	2741, 3270, 2260	2780/3780, Hasp-II Workstation
Univac	Uniscope	1004, DCT 1000, 2000, 3000
HIS	VIP-7700	G-100, DN-700
Burroughs	TC-500	TC-3500
Control Data Corp.	—	UT-200

Some Standard Line Protocols

The hardware requirement is well understood and relatively easy to obtain. The proper line protocol is not so easy.

The definition of protocols, also called line procedures or line disciplines, can be stated as "a predetermined dialogue scrupulously maintained by both ends of a communications data link." The procedure consists of an interchange of characters or character sequences that guarantees control and integrity of message transfers.

Below is an example of the most standard line protocol, the IBM Binary Synchronous line procedure. A typical transmitter/receiver dialogue includes the following steps:

1. The transmitter first issues an inquiry.
2. The receiver responds positively.
3. The transmitter then transmits text.
4. The receiver continues to respond positively. (If errors were found in the transmission, then a negative acknowledgement would have occurred and the message block retransmitted.)
5. This process continues until a mutually understood end sequence occurs.

There are a large number of line protocol designs that are optimized for all types of system criteria, such as:

(Continued on Page 32)

BST Substitute for IBM 3277 Compatible With System/3

SANTA ANA, Calif. — The Business Systems Technology (BST) division of Memorex Corp. has announced the BST/1377 CRT station as a functional replacement for the IBM 3277-2 CRT.

The BST/1377 is fully compatible with the IBM System/3, according to a BST spokesman.

The BST/1377 keyboard and CRT is used for entering and displaying alphanumeric data. By utilizing either the keyboard or the optional light pen, the operator can enter, display or manipulate data on the screen.

The screen displays 24 lines of 80 characters (1,920 characters).

For readability, the 1377 uses a 7 by 8 dot matrix to display the CRT's 89-character set on a 15-in. diagonal screen. In addition, a tiltable screen allows the operator to adjust the viewing angle for visual comfort, BST said.

Other highlights of the station include nonglare keys and CRT, a 20% faster screen refresh cycle for reduced flicker, a line and a column indicator on the 25th line and a reverse video cursor, the spokesman said.

The BST/1377 attaches to the System/3 models 4, 8, 12 and 15 via appropriate CPU features, he added.

The unit is available on a monthly rental plan and on one- and two-year leases. On a one-year lease, it costs $90/mo with maintenance.

The unit can also be purchased for $3,600 with maintenance priced at $15/mo per terminal, BST noted from 3015 Daimler St., Santa Ana, Calif. 92705.

Eotec Adds Breakout Unit

SANTA CLARA, Calif. — Eotec Corp. has introduced the EIA Breakout, a troubleshooting unit that offers two methods of determining the signal interface between terminal equipment and modems.

The first of these methods uses an LED display of 17 signals that illuminate when positive. The second uses test points that provide access to each EIA oscilloscope or other test equipment.

Using an EIA RS-232-type interface, the EIA Breakout can be installed in series between all terminals or terminal controller units and modems, the manufacturer claimed.

Troubleshooters can open any EIA signal with 21 subminiature switches and use the test points for crosswiring to any other EIA signal or to a positive voltage source.

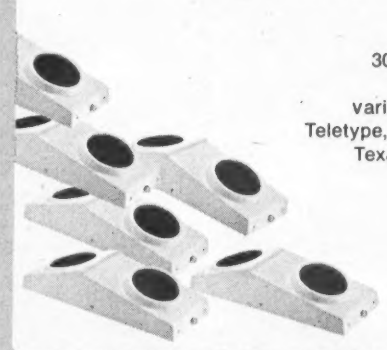
The $175 unit comes with three feet of cable from Eotec Corp., 2595 Martin Ave., Santa Clara, Calif. 95050.

CLIP AND RETURN FOR FAST RESPONSE

for a variety of terminals

☐ **Series 150A**

300 baud, 31 models
Available for a variety of terminals — Teletype, Digital Equipment Texas Instruments . . .



$147

with tape interface

☐ **302C2-13**

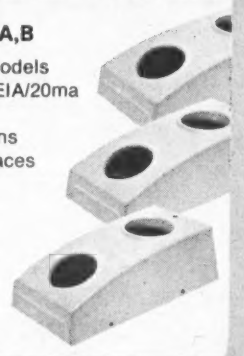
Data rate to 300 baud
Magnetic tape interface
Operates with audio recorder
Provides block and record markers

$425

with universal interface

☐ **Series 302A,B**

300 baud, 19 models
Simultaneous EIA/20ma interfaces
Hardwire options
Optional interfaces



$245

☐ **300 - 1200 baud modem** ☐ **2400 - 9600 baud modem** ☐ **Limited distance modem**

Check modems of interest and return to us for additional information

name _____
company _____
street _____
city _____ state _____ zip _____
telephone _____ ext. _____

ComData

8115 Monticello
Skokie, IL 60076
312/677-3900

New York
212/267-3696

Los Angeles
213/624-0550

member of IDCMA

~acoustic couplers

THE $99.00 MODEM*

You're suspicious aren't you? OK, we confess. Our M-1 asynchronous short haul modem won't do what a lot of other modems will do.

However, the M-1 will solve many of your local or in-house communication problems up to 10 miles or 9600 bps. And because you aren't paying for a lot of options and capabilities that you don't need in those situations, you'll be saving a bundle of money.

Interested? Write or call us now for a data sheet and complete price information.

bo-sherrel co.
36443 SHELLEY COURT
NEWARK, CA 94560
(415) 792-0354 *100 Quantity

Canadian Group Introduces Basic Glass Teletypewriter

OTTAWA — Vucom 4, a CRT terminal, has been introduced by The Computer Communications Group of the TransCanada Telephone System (TCTS) to meet the computer communications needs of business and industry for a basic glass teletypewriter.

Rates will be $115 on monthly rental and "significantly less" on two- three- or five-year Extended Term Rates for Candian users, according to a spokesman.

Quiet Operation

Designed as a basic conversational terminal with keyboard/CRT unit, Vucom 4 is said to feature quiet operation and high reliability. It can operate over the switched network or on private line facilities, TCTS said.

Compatible with most teleprinters operating at speeds from 30- to 120 char./sec, the Vucom 4 communication mode is asynchronous up to 9,600 word/min. The terminal display provides 1,920 characters in 24 lines of 80 characters each.

Additional features of Vucom 4 include the 13-key numeric pad for high-speed data entry, a multipositional cursor that can be controlled by the operator or the host computer, and upper and lower case Ascii character sets, the spokesman said.

Vucom 4 can be purchased outright for about $2,000. The Computer Communications Group is located at 160 Elgin St., Ottawa, Canada.

Protocols Key to Future

(Continued from Page 31)

- Transmission mode (asynchronous/synchronous/Synchronous Data Link Control.
- Types of transmission (full-duplex, half-duplex).
- Interactive terminal applications.
- Remote batch applications.
- Conversational services, TWX, Telex, etc.
- Specific terminal device characteristics.
- Throughput requirements.
- Error control and procedures.
- Data transparency requirements.

Host Emulation

The most popular method of implementing a protocol for communicating with a particular remote processor is to emulate or simulate a standard line protocol for that processor. This allows access without the need to program and debug a nonstandard line protocol in the host, which can be a lengthy, painful process.

For example, an easy way for a remote system to communicate with a Honeywell Information Systems CPU is to use the G-100 line protocol. The G-100 is a remote batch terminal in the HIS product line.

Conveniently, all of the major mainframe manufacturers support some kind of standard line protocols that can be used. Most have several for different types of applications. The accompanying table shows some important ones.

The table contains protocols for two different classes of applications, interactive and batch. An interactive application would be a data entry/data base inquiry/response requirement with CRT and/or Teletype input, requiring fast response times (1- to 10 sec) typically.

A batch application would be the RJE application that tolerates long turnarounds and is not serviced in real time by the central processor. Job turnarounds can vary between minutes and hours. The protocol emulation must be selected to suit the application.

Second Point

The second important point after the proper protocol has been selected is the assurance that the emulation software runs under the local operating system. Software that runs under the Data General Corp. AOS, RDOS or RTOS combines the higher level language support, resource management features that can be used in conjunction with the line protocol to a remote processor.

For example, in a dual programming RDOS environment, the system could operate as an RJE station in foreground and perform Fortran compilations, time-share Basic or execute an application program in the background.

Two Simulations

There are two protocol emulations supplied by DG that run under AOS, RDOS or RTOS. They are IBM 2780 RJE station (RSTCP, RJE80) and IBM Hasp-II workstation (Hamlet).

The IBM 2780 product is a simple RJE or remote batch terminal that supports a single job stream and consists of a remote hard-wired terminal with a printer and card reader. The IBM 2780 line protocol is supported at speeds up to 9,600 bit/sec.

The Hasp-II workstation is a higher performance RJE terminal that usually consists of an IBM 360/20 configured with a variety of peripheral devices. The Hasp line protocol supports multiple job streams, multileaving operations of up to seven input peripherals and seven output peripherals concurrently. The Hasp protocol operates at line speeds up to 56 kbit/sec.

Third-Party Options

Third-party vendors that supply protocol emulation software are also available. For example, Gamma Technology Corp. in Palo Alto, Calif., supplies a number of emulator packages that operate under RDOS — IBM 3270 emulation, Control Data Corp. UT-200 emulation and Univac 1004 emulation.

As a last resort, the user may be compelled to design a new protocol or develop an emulation to satisfy a unique system requirement.

Future requirements point to a continuing need for protocol emulation software to maintain compatability with new products and strategies or to provide access to new communications facilities like packet-switching networks.

Lynch is manager of communications and terminal marketing at Data General Corp. in Westboro, Mass.

the shortest cost between two points

Everyone is looking at the cost of communications. As the quantity of information need increases, you look toward more efficient equipment and better use of time and personnel.

At *Management Response Corporation,* we can help. With a wide selection of communications terminals like the economical Teletype model 43 teleprinter, and Digital's LA36 DECwriter II or LS120 DECwriter III consoles. And, we'll stand behind you with factory approved installation, warranty, service plans, and operator training.

We can match your present and future needs with the right hardware, full product support, and flexible sale/lease plans.

To find the shortest cost between two, points, contact us.

management response corporation
660 busse highway/park ridge, illinois 60068/(312) 698-3377
outside illinois dial toll free 800-323-2135

Perkin-Elmer: System Integration by Design

Our design engineers spend a lot of time talking to each other. In fact, we insist on it.

Thanks to all the talk at the drawing boards, we can offer you systems that perform. At peak efficiency.

We realize that the more fully you can utilize the power of your system, the happier you'll be.

That's why we design every single product to suit the system. And every system to optimize its parts.

Perkin-Elmer Data Systems designs and builds a complete line of minicomputers from our Interdata division; mass storage devices from our Wangco division; and I/O terminals from our Terminals division. They're all designed for system integration.

Excellent price/performance. Complete software. Field-proven hardware. Integrated sales and service. Worldwide customer support. Perkin-Elmer Data Systems supplies the tools and support you need.

Give us a call at our toll-free number: (800) 631-2154. We have a lot to talk about.

PERKIN ELMER DATA SYSTEMS

106 Apple Street, Tinton Falls, New Jersey 07724 Telephone: (201) 747-7900/TWX: 710-7226532

To Include 166 Branches

Bank Installing Statewide Net and Diagnostics

SEATTLE — A management control and diagnostic system that isolates data communications problems remotely is currently being installed as part of a dedicated on-line banking system at Seattle-First National Bank. When operating early next year as part of the total system, Seattle-First will become one of the nation's first commercial banks to offer statewide, on-line banking.

The system, which went into its pilot phase last month in six branches, will then be extended during the next several months to the balance of the bank's 166 branches. Seattle-First, the nation's 21st largest bank and an innovator in electronic banking, will be able to remotely diagnose and monitor data communications and data transmission in branches throughout the state.

The network diagnostic control system, as well as modems and support data transmission equipment in each branch, is supplied by General DataComm Industries, Inc., Wilton, Conn. Called Netcon-5, it will provide Seattle-First, from its computer center in Seattle, with systems control and monitoring for all stations in the bank's on-line network. As part of its on-line system, Seattle First is also installing at its branches Incoterm Corp. teller and administrative terminals and central controllers.

From the central location, Netcon-5 gives the bank a window into its analog and digital communications network. The equipment was designed to perform the two basic functions necessary to maintain on-line operations of polling and distributive DP systems. First, it identifies that portion of the system which is malfunctioning and then provides the capability to restore operations through alternative facilities.

Problems Isolated

Besides automatic diagnostic test and control functions, Netcon-5 isolates local problems when they occur. Its automatic scanning feature monitors the bank network, providing on-line diagnosis without operator intervention. When the system operates without problems, personnel are free to perform other tasks.

Should a failure occur, the General DataComm system alerts the operator with an audible alarm and a message on the console's screen. The operator, in turn, can then isolate the problem and, when possible, use restoral features to correct the failure with a minimum of downtime.

Some of the malfunctions at the branch location that are reported to the central system are no response to its command, loss of data terminal ready signal, loss of carrier from the central site and loss of data set ready signal. Based on its diagnostic capabilities, Netcon-5 can then perform such restoral features as dial backup of four-wire telephone lines, hot transfer for all remote modems upon command and modem streaming detection and disabling.

Netcon-5 consists of a microprocessor-oriented diagnostic and control system that operates out of the main channel band. It allows off-line testing and on-line telemetry functions by scanning all lines and modems on a continuing basis. At Seattle-First, Netcon-5 addresses and monitors General DataComm 2,400 bit/sec modems at each branch along with multipoint diagnostic master units which operate in conjunction with each modem and permit the diagnostic, monitoring and restoral features of the system.

NUMBER CRUNCHER

Maxi FORTRAN power at mini computer prices.

If you need heavy number crunching capabilities but your budget can't take the cost of mainframe computers, Interdata has the answer...our 8/32 Megamini® FORTRAN Processing System.

This FORTRAN system is more powerful than any other minicomputer. It has a 32-bit word length for extensive addressing and manipulation—useful for image processing and simulation. Our 32-bit word length lets you address up to 1 million bytes of memory—just the ticket in linear programming and matrix processing. There's more...floating point hardware, writeable control store, and an optimizing FORTRAN compiler.

Amazingly, this FORTRAN system is priced like a minicomputer...1/7th the cost of an IBM 370/158 or Univac 1108, the traditional number crunchers for scientific work until our 8/32 system came along. Your budget wins with appreciably lower cost per instruction.

If you have requirements or plans for large FORTRAN programs, investigate our Megamini's experience in the scientific community. Call your local Interdata office or contact me, Gary Doninger, Interdata Scientific Manager. (201) 229-4040.

Send me information on your 8/32 FPS.

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

PHONE _____

INTERDATA®

A UNIT OF

PERKIN-ELMER DATA SYSTEMS

Oceanport, New Jersey 07757, U.S.A.

DEC®

300 & 500 Systems

G/L A/R A/P P/R O/E

Medical Billing & Report Generator

Dibol® Applications Software

BUSINESS INFORMATION SYSTEMS, INC.

One Davis Blvd. Suite 509
Tampa, Fla. 33606
(813) 253-2796

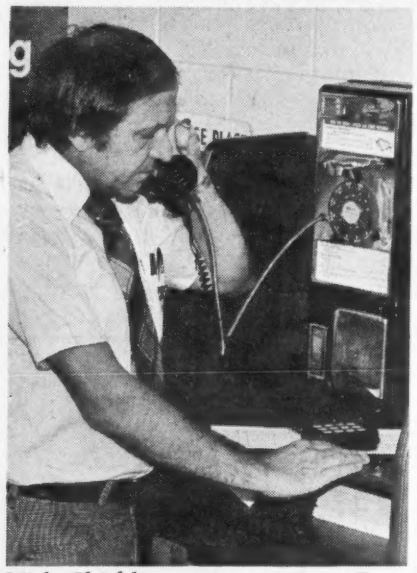
® Registered trademark of Digital Equipment Corporation

Keypad, S/7 Keep Orders Bubbling

DETROIT — In a phone booth 12 miles from the Detroit Coca-Cola Bottling Co. office, Nick Chichkan, a company salesman, dialed a number. In the Detroit Coca-Cola office, a small light flashed on an IBM System/7 and Chichkan was answered with a high-pitched tone.

He punched a series of numbers into a Port-A-Tone keypad that converts the rotary dial to a Touch-Tone telephone and was answered by a bleeping sound. The Port-A-Tone is made by Interface Technology of St. Louis, Mo., and costs about $75.

In less than 30 seconds, without speaking a word, Chichkan ordered soft drinks for a grocery store. He gave instructions on when the order should be delivered and noted that empty bottles needed to be picked up at the store.



Nick Chichkan uses a compact Port-A-Tone unit to access the System/7.

While Chichkan was placing his order, seven other account driver/supervisors were simultaneously placing other orders.

The Detroit Coca-Cola Bottling Co. is reportedly one of the first in the soft drink industry to use a System/7 to computerize its order entry system from the salesperson in the field to processing the order for delivery. The result for Detroit Coca-Cola and its customers is faster, more accurate order processing and improved service, according to a spokesman.

The System/7 can detect the sounds made by a Touch-Tone telephone and translate those sounds into specific information. Because of this ability, Detroit Coca-Cola's 34 salespersons can call the System/7 directly on one of its eight phone lines.

After the CPU answers a call, the salesperson enters a security code and then a customer code number and all details of the order including product, quantity and delivery date. The System/7 verifies the order total with the saleperson's total; it will not accept orders which do not balance, no matter how many times they are entered.

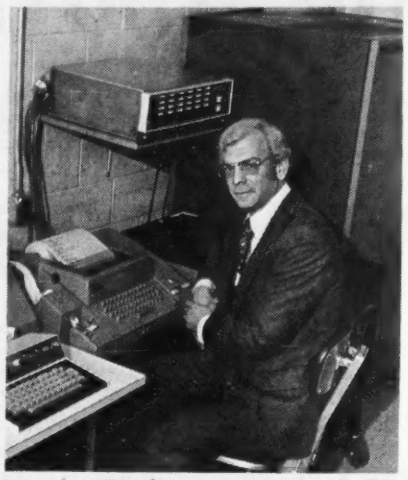
In addition, the salesperson can send special instructions with an order by entering a specific code. For example, he may tell the CPU to include a note to "stock shelves," "pick up empties," "place advertising" or "expedite."

The System/7 coordinates the order information phoned to it and records it on cards that can be accepted by the firm's Honeywell 1250 mainframe. From there the order is processed and sent on its way.

The previous system required a phone call to a keypunch operator who committed the information to cards, which were gathered four to eight times a day for a batch audit. That batch audit then was hand-checked against the original order. Twice daily, the salespeople would call to verify their morning and afternoon orders.

Warren Ginsberg, DP manager at Detroit Coca-Cola, said "the use of the System/7 saves our sales staff alone 242 selling hours per month, time that is now used to service customers and increase sales. The time savings of computer personnel is even greater.

"In addition, we can handle at least twice as many orders as before . . . and handle them faster with greater accuracy. This has allowed rapid company growth," he added.



Warren Ginsberg, manager of DP, uses the system for handling orders.

Build Your Own

SEATTLE — Thinking of building your own modem? "The Northwest Computer Club News," a publication of the Northwest Computer Club here, recently ran an article by Roger Modeem telling hobbyists how they can build such a device based on the Motorola MC6860 modem-on-a-chip.

The article, with schemata, discussed the various parts needed to build such a modem and noted it can be built for less than kits.

All is not glitter, however, as the article concluded with: "This circuit and article are offered as information only. No attempt is made to defraud, defang, defrock or discredit the Bell Telephone System . . . "

The club can be reached c/o Box 5304, Seattle, Wash. 98105.

Teledisk from Teleray!

You'll Love this Little Smart ASCII Minifloppy Disk!

Add local editing, storage and forwarding to ANY ASCII TERMINAL!

...with this all-new micro-processor-based minifloppy terminal.
- Stores 37 screens of 24 x 80 characters, or 13½ pages of 8½" x 11" printed data (71,680 characters) in non-volatile memory!
- Uses new minifloppy 5¼" media
- Two RS232 interfaces, terminal and modem
- Selectable CRT or Printer Edit Modes
- Basic functions: read, record (pack or line mode), erase, find, address, answer back, insert ("Go To" operation)

Teledisk is your answer for decreasing computer connect time, decreasing telephone connect time and the answer to unattended recording of data. Add more terminals to your computer *without* adding more ports. Call collect: 612-941-3300 and ask for TELEDISK!

TELERAY DIVISION RESEARCH INC
BOX 24064 MINNEAPOLIS, MINNESOTA USA 55424

3270/3790 Users:
There were always at least five
Now, there are at least ten.

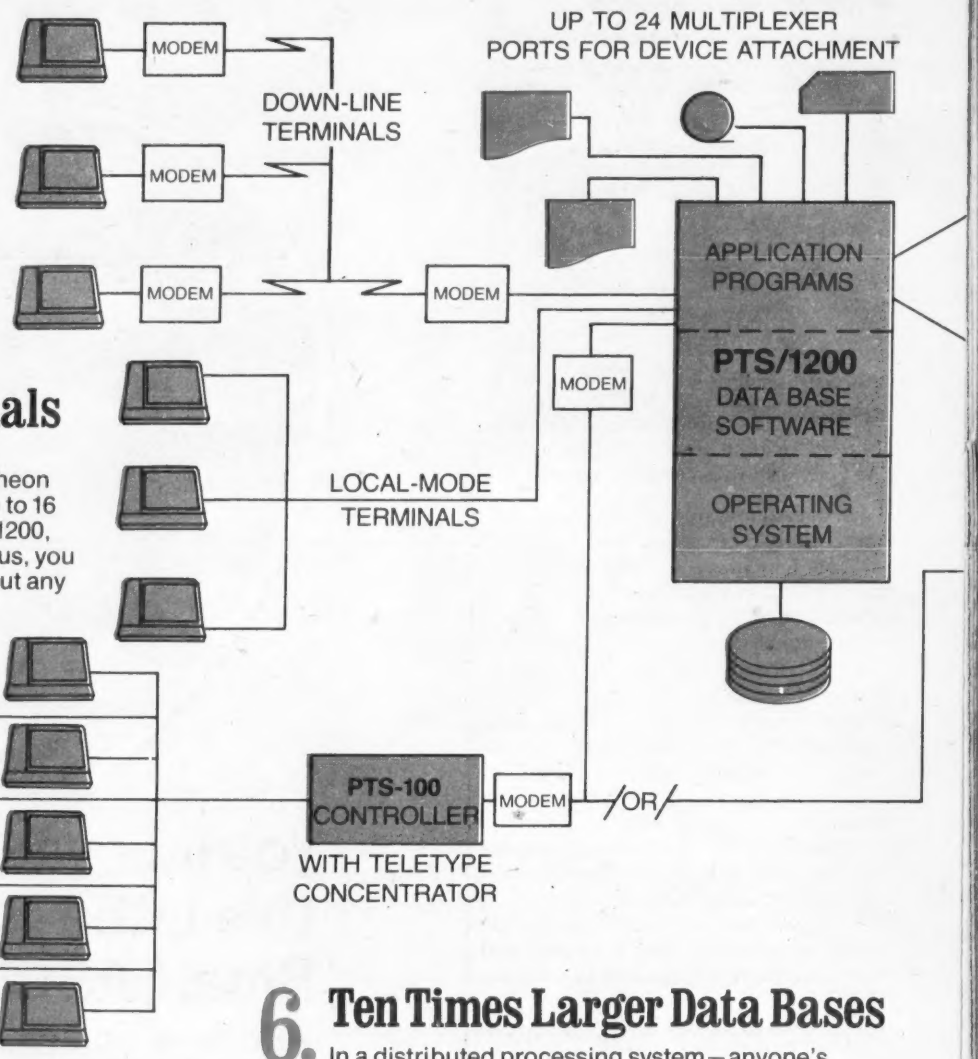
In the past three years, Raytheon has become the largest independent supplier of intelligent terminal and distributed processing system alternatives for IBM 2260, 3270 and 3790 products. Better performance, better pricing, better delivery, greater flexibility and greater intelligence were the capabilities that Raytheon offered. The result: users like yourself purchased more than 20,000 Raytheon terminals and distributed processing systems.

In the past three months, Raytheon has been busily adding more and more capabilities to its PTS-100 intelligent terminal and PTS/1200 distributed processing systems. The reason: to give you more and more reasons to keep buying Raytheon.

Here are ten good ones. Watch this space in coming months for at least five more.

1. Downline Terminals

A brand new capability of our PTS/1200 system that lets you assign the task of multi-drop terminal control, and even applications processing, to a Raytheon system, rather than to your mainframe. Of course, the PTS/1200 can communicate in either batch or interactive modes—or both concurrently—to your mainframe as needed. You can't get this from IBM.



2. Local-Mode Terminals

A long-standing capability of the PTS/1200, and one that only Raytheon offers. It means you can attach up to 16 terminals in local mode to a PTS/1200, at distances up to a mile away. Thus, you get a network in local mode without any TP requirements.

3. Teletype Concentration

Announced two months ago, after more than a year of user operation, this unique feature lets you add teleprinters to the same transmission lines as your 3270-type terminals, with maximum performance and data rates preserved. Know anyone else with this $80 a month feature?

4. Immediate Deliveries

Raytheon has always been known for prompt delivery. We know that when you need it, you want it. There are five new capabilities described in this ad. All five will be in production by June 30th. This year—1977.

5. Lowest Prices

A major attraction of Raytheon alternatives to 3270/3790 has been pricing. Even with IBM's recent price reductions, our pricing schedules permit you to obtain far more capabilities than IBM offers—at rental or purchase rates that are up to 27 per cent below IBM.

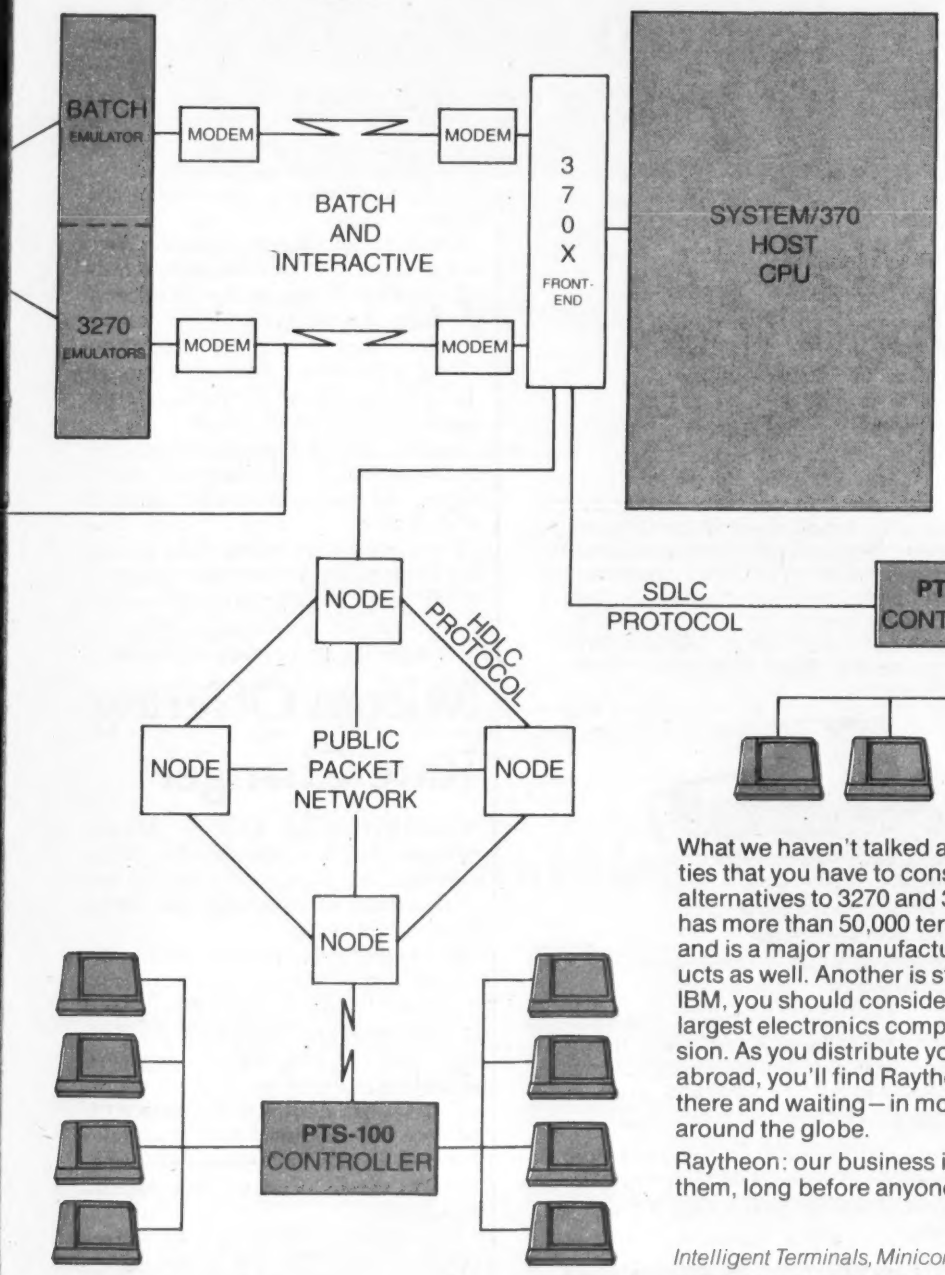
6. Ten Times Larger Data Bases

In a distributed processing system—anyone's distributed processing system—you need disk storage capacity adequate to handle the workloads. Raytheon has just announced a new 320-megabyte disk capacity for its PTS/1200 system. That's 10 times larger than the 3790's.

good reasons to choose Raytheon.

7. Simultaneous Interactive and Batch Communications

Two months ago, Raytheon demonstrated what no one else has—true 3270 concurrency. Our 3270 emulator lets you communicate interactively on a transaction basis with your host CPU. Our 2780/3780/HASP emulator package lets you—at the same time—communicate in batch mode. What counts about that is immediacy: you can do both right now, without any additional applications or front-end software development. And especially, no VTAM or NCP hassles.



8. Total Programming Freedom

This long-standing feature of Raytheon systems needs repeating. Because of the combination of high-level language, very large intelligence capacity, powerful macro routines, and numerous emulators, PTS-100 and PTS/1200 systems treat your host CPU like a peripheral. The result: data networks without network software development.

9. Packet Network Connection

Not with TTYs or ASCII-based terminals, but with 3270-type CRT devices. In March, Raytheon demonstrated its PTS-100 terminals operating on a U.S. public packet network under both HDLC line protocol and X.25 device protocol. We are the only major U.S. company operating such terminals on this international standard in other countries. Now we have it for you in the U.S.

10. SDLC Operation

And yes, every system in the PTS-100 family operates under SDLC protocol if you want it to. Or binary synchronous. Or HDLC. Or 1006. Or 2848/2260. Or Uniscope. Among many others.

What we haven't talked about here are a few other capabilities that you have to consider when you consider Raytheon alternatives to 3270 and 3790. One is experience—Raytheon has more than 50,000 terminals and controllers in use today, and is a major manufacturer of digital communications products as well. Another is stability; for the same reason you like IBM, you should consider Raytheon: we are one of the world's largest electronics companies. Another is worldwide dimension. As you distribute your information systems here and abroad, you'll find Raytheon customer and equipment service there and waiting—in more than 120 cities and 35 countries around the globe.

Raytheon: our business is to anticipate your needs and meet them, long before anyone else does.

Intelligent Terminals, Minicomputers, and Distributed Processing Systems

RAYTHEON

RAYTHEON DATA SYSTEMS

1415 BOSTON-PROVIDENCE TURNPIKE • NORWOOD, MASSACHUSETTS 02062

Call Dennis J. Reardon, Director, Field Marketing, at (800) 225-9874 (toll free)

Inside Massachusetts call (617) 762-6700 • TWX: 710 336-0646 • TELEX: 92-4408

ATLANTA (404) 321-3064 • BOSTON (617) 237-4190 • CHICAGO (312) 694-4420 • DALLAS (214) 661-9722 • DENVER (303) 371-0990 • DETROIT (313) 358-3990 • GREENSBORO (919) 294-5811 • HARTFORD (203) 243-2939 • HOUSTON (713) 771-5851 • LOS ANGELES (213) 770-4240 • MIAMI (305) 592-3884 • NEW YORK CITY (212) 661-2790 and (212) 895-2567 • PHILADELPHIA (609) 665-8466 • PITTSBURGH (412) 281-2117 • SAN FRANCISCO (415) 692-4640 • SEATTLE (206) 453-0650 • TULSA (918) 663-7852 • WASHINGTON, D.C. (703) 979-6100.

Vendor Uses Mini to Automate Remote Tests

MAHWAH, N.J — Remote field testing of data communications terminals has been automated by Western Union (WU) Data Services through a computerized diagnostic system that reportedly will provide faster service to its customers.

WU Data Services maintains a line of 10-, 30- and 120 char./sec teleprinters and CRT terminals. The automated system enables the company's field service engineers to order up diagnostic routines and terminal tests from a Hewlett-Packard Co. 2113 minicomputer and devise their own tests for computer execution on customer terminals.

Automated field diagnostics and testing represents an enhancement of the company's Termicare system, a terminal maintenance service that combines nationwide field service with a centralized customer-service. At the heart of the Termicare system is the Termicare Center, which receives calls for maintenance from anywhere in the U.S. over its toll-free lines.

Here technicians either help the customer restore his terminal to service or dispatch a field service engineer to the terminal site. Terminal problems are monitored by the Termicare Center.

Previously, automatic test capability consisted of test tapes being transmitted back and forth between Termicare technicians and field service engineers operating at customer's terminal. Alternately, the field service engineers called upon terminal controllers at the Termicare Center for the transmission of "canned" test messages.

The 2113 processor system eliminates both and simulates more exactly the computer timing of a customer's system, according to a spokesman.

Operated on the minicomputer, the system enables field service engineers to perform terminal testing on the company's entire product line. The minicomputer is said to contain all the special characteristics of each terminal type and generates tests for their special characteristics.

Terminal Transactions

Programs available in the system's library of test routines include:

- Tests specified by the manufacturers of the company's products.
- Tests historically used and found valuable.
- Tests developed to check special terminal configurations.
- Tests initiated by the field service engineers.

Field service engineers can vary the test parameters at will; they can request the number of times they want a test to be run or a change in the line length of characters, transmission rate, code, parity, minimum line length and other characteristics.

This flexibility reportedly enables them to handle unusual terminal problems that are not covered by standard tests.

For example, conducting a store-and-forward test, a service engineer can store a message of any character combination up to 240 characters in the minicomputers. The message will be sent back to the terminal under test by command from the service engineer any number of times, the spokesman said.

The system spots parity errors and prints out "Parity Errors" as well as the bit configuration of the character received in error. More comprehensive data interpretation is planned for the future.

The 2113 mini keeps a running record of all calls it receives and records all test data. It logs in the identity of the user, the duration of the testing and the types of tests requested, providing a means to monitor the usage and effectiveness of the system's diagnostic aids and terminal tests.

An HP 2645 CRT terminal acts as the 2113 console. In addition to a multiplexer, the computer system has four auto-dialers.

The auto-dialers enable field service engineers to instruct the minicomputer to call back customer terminals so they can check the answering side of the terminals, the spokesman explained.

Micom Offering Rate Changer

CHATSWORTH, Calif. — Micom Systems, Inc. has introduced a 50/56 kbit/sec rate changer as a special implementation of its Model 720 digital data multiplexer.

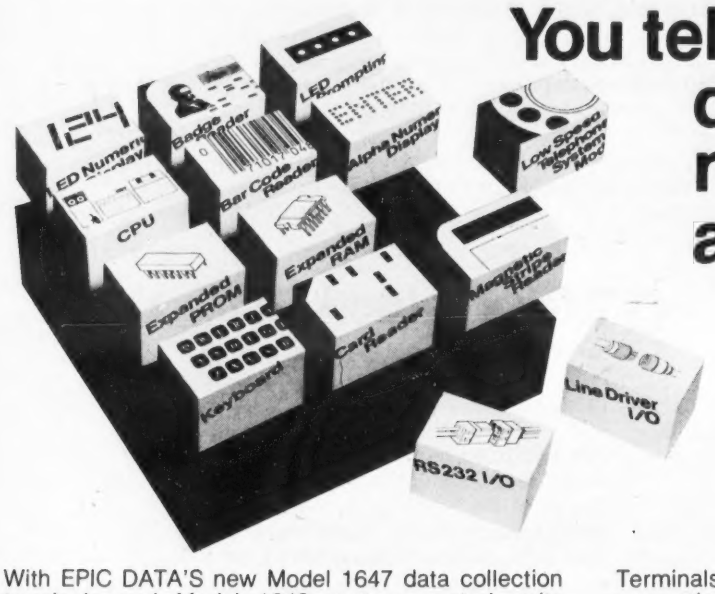
The rate changer permits tandem interconnection of digital circuits operating at 56 kbit/sec and analog wideband circuits operating at 50 kbit/sec with Bell 303 or equivalent modems, according to the firm.

The Micom hardware device reportedly can also be used to change rates between any two wideband data transmission speeds of 40.8-, 48-, 50- and 56 kbit/sec.

The higher speed composite interface operates synchronously at 56 kbit/sec using a CCITT V.35 interface, while the synchronous channel interface operates at the 50 kbit/sec speed using a Bell 303-type interface, Micom said.

Rate changing is increasingly becoming a necessity in the installation of long-distance, high-speed transmission links, the company claimed.

The 50/56 kbit/sec rate changer is supplied in pairs at $2,040 per end from the company at 9551 Irondale Ave., Chatsworth, Calif. 91311.



You tell us what your data collection requirements are.

We'll supply the parts.

With EPIC DATA'S new Model 1647 data collection terminals and Model 1648 system control units (SCUs), you can configure exactly the data collection system you need. These "building blocks," based on microprocessor architecture and modularity, allow you to provide your customers with simple, practical and flexible terminals or systems for virtually any combination of requirements they may have.

simple. EPIC DATA terminals with RS232C interface (ASCII), or optional alternative interfaces, are simple to use and deploy. No computer knowledge is required. Data collection building blocks can be combined to enable collection of information from a wide variety of pre-prepared and variable data. Maximum use of pre-prepared data reduces entry errors.

All models include an 8080 microprocessor; the user can program terminals to provide customized input, output and processing of data. In addition, programmability aids in prompting the user through entry steps, validating data and enables off-line or on-line operation.

EPIC DATA terminals weigh only 8½ pounds. They can hang on a wall, be placed on a desk, and are easily exchanged during maintenance.

practical. EPIC DATA terminals are designed with permanence in mind. Environmental tests conducted in conformity with MIL-STD-810 plus in-depth, on-site testing assure reliable operation over a broad spectrum of hostile, industrial environments. Simple design and rigorous testing have resulted in a demonstrated MTBF of over 19,000 hours. MTTR is only 30 minutes.

flexible. Choose the terminal and options which best meet your application. EPIC DATA terminals can optically read punched badges and 80-column ANSI cards. User-defined keys are available for inputting variable data. Key entry data or time of day is displayed and LEDs are available for prompting.

Terminals can be configured to scan bar codes and magnetic stripes or accommodate other peripherals through RS232 ports. Display options include additional numeric displays, up to 15 LEDs for prompting and a 32-character alpha/numeric display. A low-speed modem and serial asynchronous or synchronous communications ports with either RS232 or line driver I/O may be added. Both PROM and RAM memories are expandable.

SCUs. Model 1648 SCUs can be configured to poll up to 100 terminals, assemble transactions, format data, append time and date, and store or forward collected data to the host.

Let EPIC DATA show you how microprocessor-based architecture and building block modularity will provide you with simple, practical and flexible data collection terminals and SCUs.

OEM quantity (100) prices start at approximately $1000. Contact your Epic Data representative today or write:

epic data corporation
6350 LBJ Freeway/Dallas, TX 75240
Phone (214) 387-3121/TWX910-860-5676

Sales Offices: 6350 LBJ Freeway, Suite 127, Dallas, TX 75240, (214) 387-3121 • 17 Amfer Court, Bayshore, NY 11706, (516) 666-0797

Representatives: ARIZONA BFA Corporation (602) 994-5400 • CALIFORNIA Moxon Electronics (714) 635-7600 • FLORIDA COL-INS-CO (305) 423-7615 • ILLINOIS Systems Marketing Corp. (312) 593-6220 • MARYLAND Electronic Marketing Associates (301) 881-5300 • MASSACHUSETTS J & J Associates (617) 272-2606 • NEW YORK Cane Technical Sales (914) 698-4411 • NEW YORK Ossmann Instruments (315) 437-6666 • PENNSYLVANIA WKM Associates (412) 892-2953 • TEXAS DMA (713) 780-2511 • WASHINGTON DPM Associates (206) 453-9082 • MEXICO Electronica Hemisferica, S.A. Mexico City (905) 2-50-60-11 • UNITED KINGDOM Sintrom Elinor Ltd. Reading (0734) 65464

Advertisement

DP Dialogue

Notes and observations from IBM that may prove of interest to data processing professionals.

TOPS supports freight car classification at Southern Pacific's Bayshore Yard, just south of San Francisco. Data on car movement is supplied by 545 terminals linked by telephone and microwave to dual IBM computers.

TOPS Saves Southern Pacific $6 Million Yearly

The Total Operations Processing System (TOPS) of the Southern Pacific Transportation Company keeps track of the 100,000 freight cars that roll over 13,445 miles of railroad. According to railroad president Denman K. McNear: "TOPS is producing tangible recurring savings of $6 million annually."

Terminals in switchyards throughout the vast rail system supply data on car movement to TOPS' dual System/370 Model 168's in Southern Pacific's San Francisco headquarters. From there, TOPS assigns cars to shippers, directs their movements and stores each car's current location. As a train approaches a switchyard, TOPS transmits the "consist": a listing of all cars, their contents, destination and special handling instructions. From this, yard men create a track list which directs switching operations. When a departing train has been assembled, its new consist is transmitted to TOPS.

"We've been installing programmable units of the IBM 3770 Data Communication System at our terminal locations," says J.W. Germany, vice president of management services. "We can perform local switchyard data processing functions as well as computer input-output on the 3770. This integration has speeded up operations in the yards and cut down on errors.

"Overall, there has been no increase in our hardware costs, and TOPS data is more current. The higher data rates of the 3770 make better use of our communication links, resulting in further direct savings.

"The 3770 has opened the way for continuing enhancement of TOPS. We are currently running a pilot project in which we eliminate the paper waybills which accompany all freight cars. Instead, TOPS supplies required waybill data through the 3770 system.

"This is a substantial change in how we operate, and it holds a lot of promise. We're projecting important gains in personnel productivity, customer satisfaction, cash flow, error control, and shortened time from completion of movement to rendering of the bill."

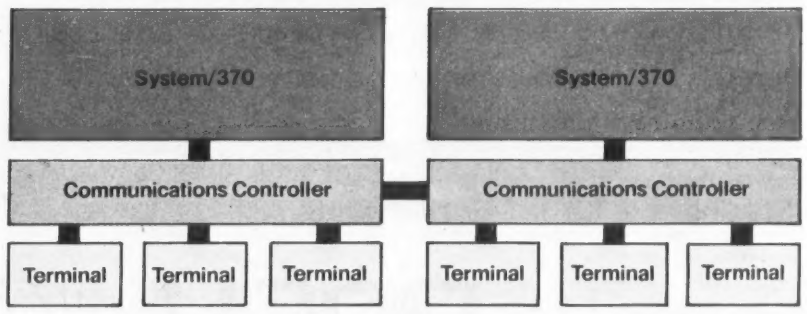
Adds railroad president McNear: "The TOPS data base has made possible online inquiry of car location for shippers. And it permits better planning and better reporting on all levels of management."

Networking Extends the Reach of Computers

The engineer, visiting corporate headquarters, has a sudden requirement for a mathematical routine resident in a plant computer many miles away. He sits down at a terminal in headquarters—one which normally accesses business applications in the corporate computer—and logs on just as if he were at the plant. The local system senses that he is requesting a program only available at the plant, and routes his request to the computer there.

Similarly, a headquarters visitor to any company location with a terminal can as easily establish a link with an application in the corporate computer.

This mode of computer use is a feature of *networking*, and now a new form of networking is available from IBM under Systems Network Architecture (SNA). Called Advanced Communication Function (ACF), it includes enhancements to both the Virtual Storage operating systems for System/370 and the Network Control Program for the 3705 Communications Controller.



The 3705 can automatically switch a service request at any terminal to an application in any computer in the network. This action is "transparent" to the user, who sees a "single system image" and is not aware of or concerned with the computer to which his work is routed.

ACF provides an architecture which lets the user specify recovery procedures, switching rules, the Initial Program Load (IPL) sequence, emergency reduced-service operation, and communication to and from operators. This structure is provided by the Network Operation Support Program (NOSP)—a programming mechanism by which the user enters his own decision rules and priorities.

Networking with ACF offers great advances in reliability, availability, and cost/performance. Idle capacity can be put to use quickly since a new application can be installed wherever there is room for it. And ACF can greatly improve the economics of such general applications as text processing and interactive training systems, by making them widely available through existing terminals. Similarly, more terminal sites become economical, since each can access more applications.

Tying computers together in a network makes their power more accessible, reliable and economical. It extends their reach to more users and into new application areas.

DP Dialogue is designed to provide you with useful information about data processing applications, concepts and techniques. For more information about IBM products or services, contact your local IBM branch office, or write Editor, DP Dialogue, IBM Data Processing Division, White Plains, N.Y. 10604.

IBM
DATA PROCESSING DIVISION

Give us 3 minutes

and we'll show you how to cure your 2501 headache

We're that sure of our new 6501 Buffered Card Reader. Call us and we'll tell you more about how:

- The buffered DOC 6501 can be installed on ANY position on the channel and puts an end to channel OVERRUNS.
- The buffered DOC 6501 gently handles and increases the life of repetitively read card decks.
- The buffered DOC 6501 saves you 25% or more than a 2501.
- The buffered 6501 can be purchased or leased NOW.

If you aren't convinced in three minutes, we'll send you some buffered aspirin. With an unbuffered 2501 you'll probably need it.

Call John Sterling at (800) 327-6424 or (305) 724-1111.

DOCUMATION
INCORPORATED

Or call, Atlanta, GA (404) 955-0309; Boston, MA (617) 890-2650; Chicago, IL (312) 782-0551; Dallas, TX (214) 661-9902; Detroit, MI (313) 353-8181; Greenwich, CT (203) 869-4123; Hartford, CT(203) 278-2010; Houston, TX (713) 780-1432; Los Angeles, CA (714) 752-8782; Miami, FL (305) 592-9655; New York, NY (212) 695-4195; Oakbrook, IL (312) 920-0551; Philadelphia, PA(215) 574-0950; San Francisco, CA (415) 574-4060; Washington, DC (703) 356-2050. **International Offices:** London — Staines 61124; Paris 686 8207; Toronto (416) 622-8720; Germany 06 11/728 128; Spain 416 87 60.

NCR Unwraps Largest Interactive 8000

DAYTON — NCR Corp. has introduced the latest model in its 8000 series, the I-8430, which is the largest interactive model NCR has released to date.

The heart of the I-8430 is a 112 nsec CPU that utilizes ECL circuitry, internal transfer-bus architecture and user diagnostics, according to the firm.

Memory available with the sysem ranges from a minimum 128K to 384K bytes. Memory increases come in 64K-byte increments, a spokesman said.

The I-8430 can accommodate NCR's complete library of interactive Cobol programs, he claimed, noting that Cobol programs developed by NCR, its users and by independent software houses for the NCR I-8200 series machines will run on the I-8430 without modification.

System options include two additional trunks to bring the total possible up to three and an integrated disk controller which allows one string of up to eight spindles.

The system can operate with CRTs, card readers with speeds up to 600 card/min, line printers up to 900 line/min and 10M- to 67M-byte disk units with transfer rates up to 885 kbyte/sec.

The basic I-8430 with 128K bytes of memory costs $71,500 and rents for $2,050/mo. A system with CPU, 256K bytes of memory, 10 CRTs, 67M bytes of disk storage capacity and a 300 line/min printer rents for $3,900/mo and sells for approximately $196,000.

NCR also released for sale its 721 communications processor. The processor is already installed in several communications networks.

The processor, although it predates NCR's recently announced distributed network architecture, can be conditioned to conform to the latest NCR architecture, the spokesman said.

Join the Show

WALTHAM, Mass. — Users who bring magnetic tapes to Info '77 in New York' Oct. 17-20 will have an opportunity to see their own reports printed on a Honeywell Information Systems, Inc. Page Printing System (PPS).

The HIS offer applies to users of IBM 360/370, Burroughs 6700, Univac 9700 and HIS Level 66 Series 6000 or Series 2000 CPUs.

Users interested in participating in the demonstration should contact Russ Bishop at HIS, 200 Smith St., Waltham, Mass. 02154, before Oct. 10.

'Independence' Can Liberate User Budgets

By Richard Egan
Special to CW

In an unparalleled technological boom, DP has evolved in two short decades from the wonderful to the commonplace. Computers permeate our society, making it possible for us to do scientific research, manufacture goods, cash checks and even get on junk mailing lists faster and more efficiently. A recent study showed there are more jobs for college graduates in the DP field that in any other except engineering. In short, we take computers for granted.

The one thing professionals in the field cannot take for granted any longer is the increasingly high cost of DP equipment. "Cost-effectiveness" has become the industry's favorite buzz word.

DP managers, faced with greater demands for service and tight budget constraints, are less willing to accept the costly, packaged solutions of single vendors and are becoming more independent in their choice of both software and hardware components.

The independent plug-compatible peripheral industry has developed in response to that growing user independence.

The independent manufacturer, whether his product is tape drive, disks, terminal or main memory, must compete head-on with large, entrenched vendors. The independent manufacturer must deliver better performance at a lower price if he is to survive. That fact can, and does, work to the independent-minded user's advantage. Over $2 billion worth of independently supplied DP equipment now operating successfully in the field represents an almost equivalent amount of savings to the user community.

A good example of the savings available through the acquisition of equipment from an independent is the cost of 512K bytes of 370/145 memory:

	Price	Savings
New from IBM	$192,800	none
Used IBM	$125,000	$ 67,800
Independent (Cambridge Memories 370 Stor/145)	$ 75,000	$117,800

The same 30% to 40% savings holds true generally regardless of the size of the mainframe being upgraded with add-on memory, whether it is a 360 or a big 370/158 operating in a virtual storage environment.

The catch is that if you own your own IBM mainframe or lease it from a third-party purchaser, IBM will not rent additional main memory to you. You have to buy it outright at around $250,000/M byte. If, for example, your need for additional memory is linked to a specific short-term project, the cost is prohibitive.

If your IBM mainframe is rented, you can add memory, but only at the cost of signing a four-year Term Lease Plan and paying extra-use charges. If your projected needs are reduced unexpectedly and you no longer require the extra memory, you're stuck.

Independently supplied expansion memory offers more flexible acquisition terms compatible with your specific long- and short-range planning. Most independent memory can be leased over a variable term or purchased. The fact that your CPU is rented, leased or owned is irrelevant.

In addition, you can easily reconfigure your system upward or downward to meet changing workloads or budget requirements. Independent memory modules may even replace all but the minimum amount of IBM-resident main storage (512K) for major savings on rented equipment.

Extra Budget Savers

In addition to the obvious equipment acquisition savings, independent equipment offers users several other benefits that can have a substantial effect on the bottom line.

Many independent suppliers offer higher density tape and disk storage capacity for faster transfer speeds and better utilization of I/O devices.

Double, sometimes quadruple, capacity main memory modules ranging in size from 512K bytes to 7,680K bytes are available only from independents. These not only improve throughput in many applications, but also allow users to upgrade service without giving up older, reliable and — often — fully depreciated CPUs.

CPU enhancements available from some independent vendors have increased throughput anywhere from 10% to 20% and at costs dramatically lower than acquiring a new CPU.

Energy savings are also more likely with independent equipment. For example, main memory is usually available a year or two after a vendor such as IBM or Digital Equipment Corp. makes its first customer shipments. Therefore, the later-introduced memories can take advantage of more advanced technology.

As an example, the 512K-byte Cambridge 370 Stor/145 memory requires only 1.8 kVA while the same capacity IBM memory consumes 5.8 kVA. Assuming the user pays 4 cents per kilowatt hour and air condition-

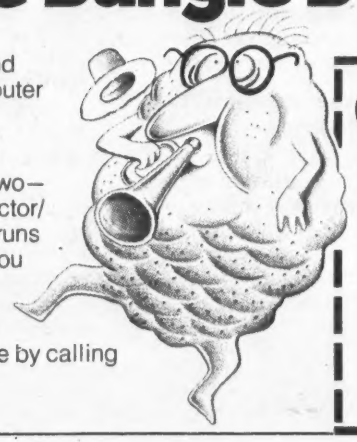
(Continued on Page 48)

The Boogie Woogie Bungle Boy of Company B.

He's got everybody dancing. Last week, with a blare of re-runs and shutdowns, he cost Company B thousands of dollars in lost computer time. So Company B banished ABENDS like him forever with Computer-Link's complete Data Media Maintenance Systems.

Our Tape Evaluator/Cleaner performs five tests—not just one or two—to find bad tapes before your computer does. And our Disc Inspector/Cleaner eliminates data checks that turn into disasters. For print runs you can read, Computer-Link's Line Counter automatically tells you when to change ribbons.

Find out how much more reliable your system can become by filling out the coupon. Immediate detailed information is available by calling toll-free: **800-225-1616.**



COMPUTER-LINK CORPORATION
14 Cambridge St., Burlington, MA 01803

Please send me a brochure on:
☐ Tape Evaluator/Cleaner
☐ Disc Inspector/Cleaner
☐ Line Counter

Name_____
Address_____
City_____ State_____ Zip_____
Company_____

Five Suggestions Offered

Data Entry Savings Means People Management

By Ron Henderson
Special to CW

Month after month, users are being bombarded by a parade of new computing products. With the advent of bubble memories and microcomputers we are rocketing ourselves into a world that would startle even Buck Rogers.

But too little attention has been given to the all-too-familiar problem of capturing data to feed the voracious CPUs. Our main focus has been to "solve all problems with hardware." However, the simple fact remains that to continue to make computers work, someone has to depress keys, punch cards, write output tapes or directly enter data.

Let us not forget punched cards were first used in 1890 to tabulate the U.S. census. Now, 87 years later, we're still punching cards. Outside of some optical character recognition applications, the prospects for eliminating hand keystroking is doubtful in our lifetime. Data entry operators, whether centralized or dispersed, will remain a permanent part of any DP operation.

In recent years there have been numerous improvements in data entry systems. "Plain vanilla" has given way to "hot fudge with whipped cream and cherries" systems. These delicious new systems eliminate large numbers of keystrokes and costly errors while transferring many functions off the mainframe.

However, in spite of these new data entry systems the bulk of all data is captured by people. Computers need data entry people, for people have this wonderful ability to scan a disorganized source document, read the most ridiculous handwriting and spot mistakes no computer could possibly detect.

But some operators are more productive than others, so to stretch the data entry dollar a manager must make the best use of his people. Imagine what would happen if all data entry operators started increasing their keystroking rate by 30%. Imagine what that would do to the budget.

It probably isn't going to happen, but still we have to ask ourselves how is it some people can actually keystroke at 18,000 strokes per hour while others can only do 8,000. Why are there such wide disparities among people using the same source documents and systems?

More importantly, how can we help data entry people be more productive and happy . . . and in the process stretch our budget?

Here are five suggestions for increasing data entry productivity:

• Aptitude — Anyone who selects an operator with good experience over a person with certain high aptitudes may be sorely disappointed. With good hand-to-eye coordination, fast finger dexterity and a high degree of numeric and verbal reasoning, an inexperienced person can outperform the experienced operator with less aptitude within three months. Unfortunately, you can't train someone to have better aptitudes. Either you were born with them or you weren't. People with great attitudes, good attendance records and poor aptitudes can work as hard as they want, but they can never meet the level of performance of the people with the right aptitudes.

• Attitude — Operators can sometimes whiz through the day at fantastic rates of speed. Nothing seems to slow them down. How wonderful it is to have people who key 15,000

(Continued on Page 48)

Turning a profit in turnkey systems:

If your business is selling turnkey computer systems, using the right computer can be the key to making more sales—profitably.

You need a computer that's easy to use—and adaptable to many uses so you can get more customers. And you want a computer that's priced to sell, at a margin that's profitable.

You want a computer that can really protect your proprietary software—keep it safe, and saleable, sale after sale. And you need a better way of supporting your software than having to visit sites.

You need a computer with proven reliability, so there'll be fewer service problems. And you want a fast, dependable service network when there are.

Needs and wants met here

For all this, the one computer you want is the one we make:

The BTI 4000 Interactive Timesharing System.

It's a ready-to-go system with 10 megabytes of storage, magnetic tape drive, and 8 ports—just add terminals. And it's easily expandable—add disk storage to 400 megabytes, increase user capacity to 32 ports, add peripherals like industry-compatible magnetic tape and a line printer.

The BTI 4000 is designed, manufactured and supported by Basic Timesharing Inc. We're the manufacturer with timeshare experience. Which has helped us produce a computer uniquely right for multi-user applications.

A dedicated performer

The BTI 4000 has been proven in all kinds of applications—general accounting, dealer inventory control, entertainment ticketing, text publishing, school administration, and more.

What's more, the BTI 4000 is proving its reliability at locations in 39 states, in 5 provinces of Canada, and in Europe, too.

Things you'll like

The BTI 4000 uses BASIC-X, an unusually powerful extension of BASIC. With the features you need to get your software up—quickly, efficiently. So you can start selling sooner.

The BTI 4000 Means Business.

Especially important to you, the BTI 4000 protects your proprietary software. So you can count on selling it again, and again. Without losing control of it. And with the convenience of dialup access, so you can support it without the cost of site visits.

Things your customers will like

The BTI 4000 is a true timesharing system. It allows doing any mix of tasks, all at the same time, from any number of locations.

Your customers will enjoy faster response, because the BTI 4000 implements many of your application program operations in firmware.

The system also offers continuous availability, because software backups, updates, and other housekeeping activities can be performed locally, remotely or programmatically, with users on the system.

And the BTI 4000 is so easy to manage, your customer won't have to add a specially-trained employee just to run it.

Service—good and fast

In the packaged systems business, service can have a real impact on your success.

That's why service is such an important part of our business.

The BTI 4000 is designed for over-the-phone, on-line diagnosis of actual and potential problems. 24 hours a day, 7 days a week, we're ready to help. If a BTI 4000 ever needs on-site service, we have a network of field specialists to provide just that.

Priced to please

A single BTI 4000 costs $35,950. There are attractive quantity discounts—like $28,760 each for a quantity of 10.

For that price you get all the features and support benefits mentioned above, not a scaled-down version.

You can get complete information at your BTI regional office, listed below.

The BTI 4000. It could be your key to turning more profit in your turnkey installations.

Basic Timesharing Inc., 870 W. Maude Ave., Sunnyvale, CA 94086. Sales Offices: East: Cherry Hill, NJ (609) 662-1122; Midwest: Minneapolis, MN (612) 854-1122, Chicago, IL (312) 298-1177; South: Dallas, TX (214) 630-2431; West: Sunnyvale, CA (408) 733-1122, Anaheim, CA (714) 533-7161

ASSISTANT DIRECTOR

For operations and Technical Support - Administrative Computing Services. Degree + 4 years experience in systems analysis, programming or computer operations. Management experience and knowledge of computer operations, OS, CICS, COBOL, JCL & RJE preferred. Salary $15,117-$17,000. Send resume to Doug Duncan, Employment Coordinator, 2nd Floor HUB, University of Florida, Gainesville, FL. 32611.

Equal Employment Opportunity Affirmative Action Employer

'Ease of Use' Has Become Latest DP Buzzword

By Douglas J. Bartek
Special to CW

In the first 20 years or so of the computer industry, success among computer manufacturers was measured by superior price/performance of hardware and utilization of special operating system capabilities. However, in later years there has been a growing demand from the DP industry user community for systems that offer not only hardware efficiencies, but also better user conveniences and tools for maximizing the productivity of personnel. As long as hardware unit costs continue to drop and the cost of personnel continues to rise, this area — ease of use — will receive increasing attention.

The idea of stretching the DP dollar through easier-to-use systems is not new, of course. But because of the industry's past orientation to the DP professional and his use of the computer, some of the best ways of increasing productivity have been largely neglected. This includes expanding the use of the computer to the non-DP potential end user (businessman, executive or clerical personnel not trained in DP).

Industry efforts have been started in this area, particularly in the word processing and small business systems marketplaces. These efforts are expanding upwards into the larger mainframes as the value of easy-to-use systems and tools becomes more and more obvious.

'Different Strokes . . . '

This has created some semantic problems in the industry, as "ease of use" implies different things to the three different types of current and potential equipment users. "Ease of use" to an operator may imply a special function key on the system console. To an applications programmer it might imply a utility package to aid in debugging. To the non-DP end user it may mean simply asking the computer a question in the form of a natural English sentence and getting a natural answer in return.

Emphasis in the past has been placed on ease of use for systems personnel, perhaps since software developers are more familiar with their particular needs. Systems personnel are the operators, system engineers, systems programmers, librarians, etc. responsible for the maintenance and well-being of their system.

This group is concerned with optimizing resource utilization, developing scheduling procedures, the physical custody of the installation's data bases, the required security controls, new software release updates and other matters. Thus, ease of use for systems personnel is concerned with accessibility of system functions, diagnostic and monitoring capabilities, easy software release installation, minimizing operator intervention in handling of jobs and simple console interaction, among others.

The application programmers analysts are those who interpret the end users' needs and develop the procedures and programs required to obtain solutions. Ease of use for application programmers/-analysts implies a DP facility which is available when needed and which provides quick and accurate feedback in understandable terms.

It also means to them a system which is consistent across all interfaces and a system in which they do not have to be concerned with particular methods the system uses to access data files and communicate with remote terminals. They should not have to be concerned with internal details of the system, specific resources used or the internal language of the system.

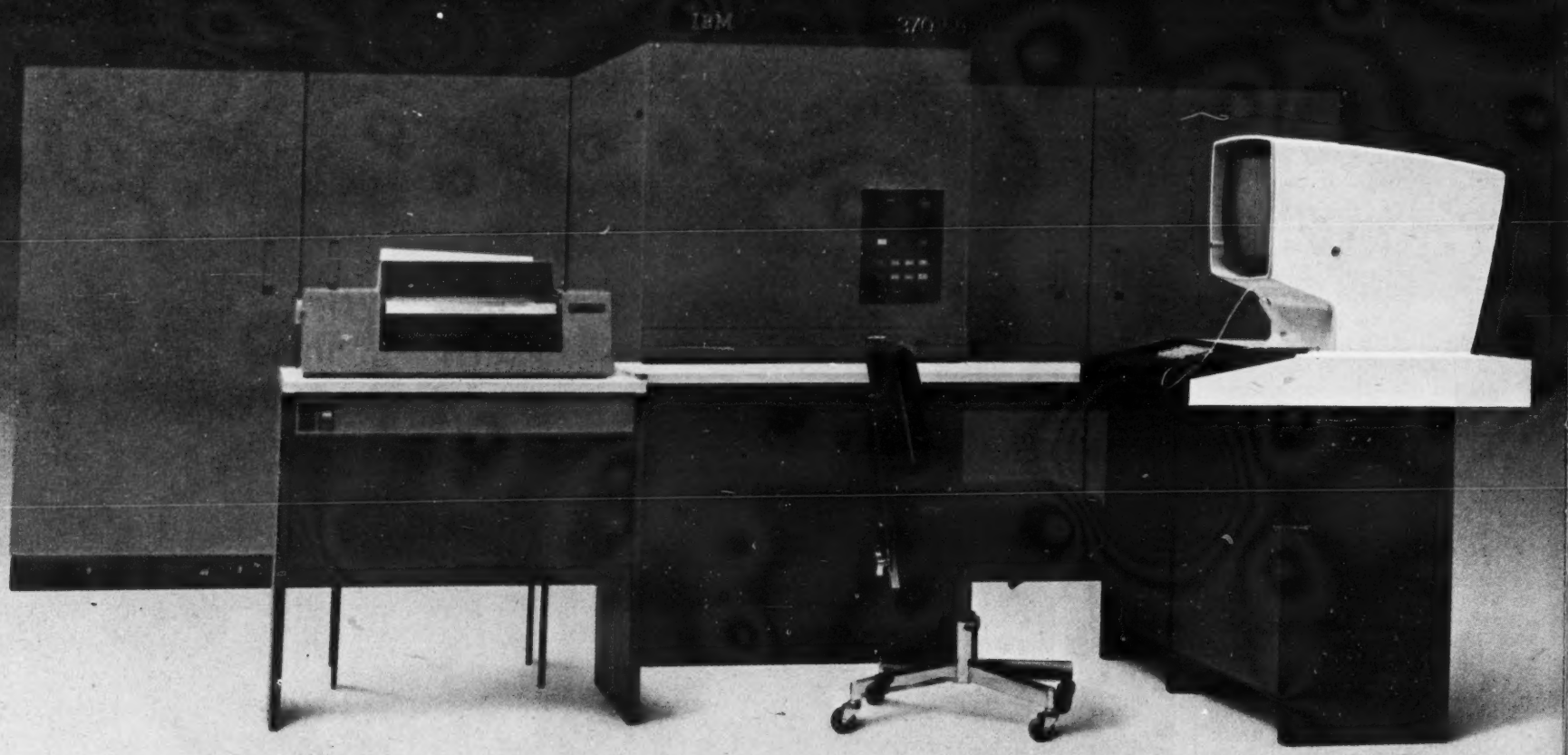
Ease of use for this class includes the facilities, capabilities and tools to improve programmer productivity, to allow them to be more responsive to user requests, to do their job with fewer and/or less-skilled personnel and to better utilize their production and development activities.

End users of DP systems include all those who use the system's output or results to perform their jobs. They may not be acquainted with DP technology and, in fact, probably care little about the details of DP systems. To them DP is simply one service among many they might em-

(Continued on Page 46)

SYSTEM 2000®
Puts your resources to work
Data is a valuable resource. Without proper management, its usage becomes inefficient and impacts the productivity of your other corporate resources.
MRI's SYSTEM 2000 can put your data to work, can make it serve your company in many, many beneficial ways, and can take some of the workload off those other valuable resources.
SYSTEM 2000 is a versatile data base management system designed for users of IBM, CDC, Univac, and Amdahl computers. Working with a wide variety of applications, with data bases ranging from 300,000 to more than 1.5 billion characters, with non-data processing personnel as well as highly-skilled programmers, SYSTEM 2000 provides flexibility and efficiency in even the most complex environment.
To find out how hardworking your resources can be, contact our nearest marketing representative or MRI corporate headquarters. Find out how resourceful and hardworking our people are in ensuring that your needs are met. Ask about the new DOS/VS version and CONTROL 2000, MRI's data dictionary.
Put your resources to work . . .
and take advantage of ours.
SYSTEM 2000
mri
SYSTEMS CORPORATION
HARDWORKING
THE DATA BASE MANAGEMENT COMPANY
12675 Research Blvd., Austin, Texas 78759, (512) 258-5171
U. S. Sales Offices: Boston • Chicago • Houston • Huntsville • Kansas City • Los Angeles • New York • San Francisco • St. Louis • Washington, D. C. •
International Sales: MRI Systems (Canada), Ltd. Toronto • GCS Products, Brussels • Dusseldorf • The Hague • London • Paris • SYNTAX, Milan • PAR, Stockholm • CUK Co., Ltd., Tokyo • Eastern Information Medard • Kashiba Computing Services • Seiko Computer Services, Inc. (SCSI) • Cal Data Systems, Inc. (Singapore) • Cannon Systems Group • Computer Network Corporation (CONNECT) • Computel Systems, Ltd. • CYBERNET Services (CDC) • Information Systems Design, Inc. (ISD) • Industrial Life Technical Services, Inc. (IST) • Intonet (CSC) • Datacrew, Ltd. • Litton Computer Services • Systems Dimensions, Ltd. (SDL) • Tymshare, Inc. • United Computing Systems, Inc. (UCS)

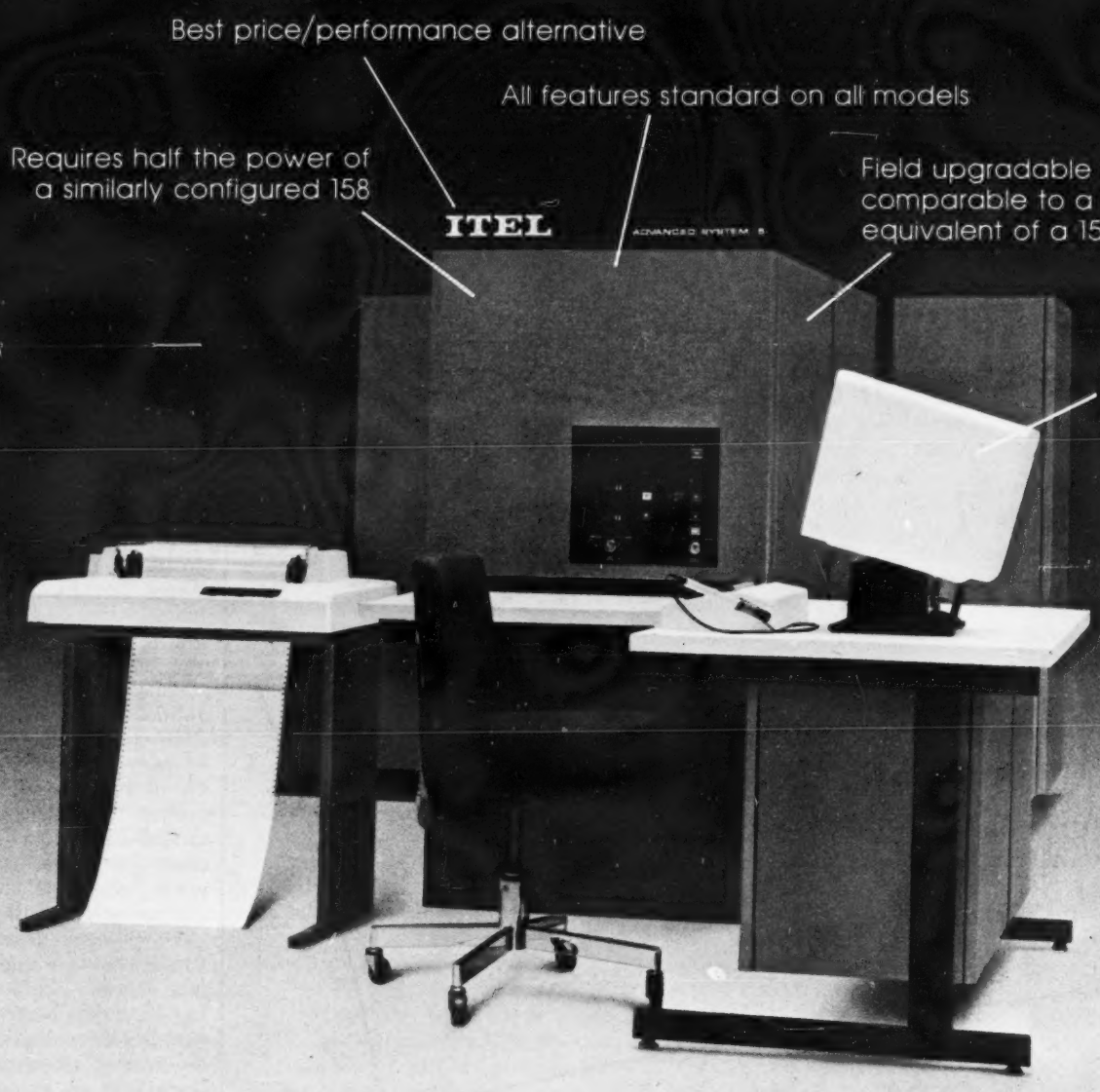
IF YOU DIDN'T HAVE TO COMPARE PRICE,



Of course, when making a large investment, you would compare price–and find that Itel offers you substantial savings over IBM. But if you didn't have to compare cost, you'd compare features–and choose Itel's Advanced System.™ Because we took IBM's best concepts and improved them.

Dramatic advances in the semiconductor industry have allowed us to build a more compact, more reliable and more powerful CPU using about half the components IBM uses. Which means Itel's Advanced System takes up much less space than the comparable IBM system. In addition, the Advanced System runs approximately 9 degrees

WHAT WOULD YOU COMPARE?


Best price/performance alternative
All features standard on all models
Requires half the power of a similarly configured 158
Field upgradable from a system comparable to a 148 to the equivalent of a 158-3
100% functionally and operationally compatible with a 158
ITEL
ADVANCED SYSTEM 5

cooler, increasing the reliability of its integrated circuits.

And it comes complete, including a 180 cps printer. No optional "special features" that often end up costing you almost as much as the system itself.

What's more, the Advanced System's flexibility helps prevent obsolescence and protect your investment–all six of our models can be either upgraded or downgraded, as the situation demands.

Itel's Advanced System gives you everything its IBM counterpart does, and in some cases, more. But, even with all our features, the Advanced System will cost you less than the comparable IBM system.

When it comes to price, features and performance, Itel is the only sensible alternative to IBM. Not only in total computer capability, but in systems and software, in computer peripherals, in field engineering, in financial packaging.

Itel. The sensible alternative.

ITEL
CORPORATION
Data Products Group
One Embarcadero Center
San Francisco, California 94111
Telephone: (415) 955-0000

***See Itel's Advanced System/5 in operation at booths #102-106 during the DPMA show in Washington, D.C., October 9-12.**

Bowe Burster

PLAINVIEW, N.Y. — Bowe Systems is offering a burster that can handle up to eight-ply forms and processes up to 550 ft/min, according to a spokesman.

The Model 321 features programmable command cards in the form of printed circuit boards with electronic controls and electronically assisted servo mechanisms

Unit speed can be user-regulated, he added.

Center cutting and margin trimming can be accomplished with two margin trimmers and a longitudinal center cutter that are standard equipment, the spokesman said.

The Model 321 costs $10,900 from Bowe at 175 Express St., Plainview, N.Y. 11803.

'Ease of Use' Latest DP Buzzword

(Continued from Page 43)

ploy to solve their problems or to perform their work. Whether they employ it depends on how easy it is to use and on its accuracy, timeliness and cost.

Thus, ease of use to the end user centers around the user interface itself. The user must be able to interact with the interface in the user's "source" language; i.e., a businessman or secretary should be able to retrieve a "report," not a file under a certain catalog in the file system, and be able to make changes to it using simple commands or physical actions without worrying about temporary scratch files and buffer storage.

The end user also needs a simple, consistent command interface to allow him to state the developed solutions in terms that are meaningful to his area of expertise, without requiring him to learn the idiosyncrasies of the DP system. Furthermore, the end user needs user-oriented, easily understood documentation that describes the system's external behavior without describing the internals.

End Users Organize

The growing end-user orientation may, in fact, be the prime vehicle for stretching the DP dollar and system productivity in the near future. End-user organizations are becoming more actively and directly involved with access to their data and manipulating it for their needs. These organizations need facilities and capabilities to get responsive results and are pressuring their DP organizations to acquire the needed capabilities for them.

In a recent ABC Management Systems survey concerning non-DP end-user capabilities, 93% of the DP professionals in most companies have selected a variety of reporting, retrieval, file and data base management systems, making programming easier, faster and cheaper for programmers, analysts and systems personnel. But fewer than one in 10 non-DP end users — the businessman — is prepared to learn how to fill in some coded forms or to learn some simplified kind of programming. These are too complex for the remaining nine out of 10 businessmen.

Further evidence of this lack of end-user orientation to date are the findings of the End User Facilities Task Group, now a full standing committee of Codasyl, which stated in a recent report: "The current interfaces claim to be designed for the non-DP-trained end users, but, in fact, they are similar to computer programming languages, without any effort to establish that such interfaces are the best and that they are truly effective."

Increased Emphasis

Undoubtedly, the future will see increased emphasis placed on the non-DP end user as a means of stretching the DP dollar. Just as the past has seen advances made first for systems personnel (for example, assembly language coding over machine language), and then for application programmers/analysts (higher level languages and operating system utilities) as a means of increasing productivity, the end user should begin to see major improvements in the future. Th driving forces of economics are present, intensified by a movement toward distributed systems, which will ensure that the computer becomes more accessible to the non-DP-professional end user.

We will begin to see, among other advances, natural English language (not just 'English-like") query systems attached to data base systems in order to simplify the extraction of data. We will see greater use made of special functions keys on terminals to perform a series of tasks specific to the individual user's environment.

In general, ease of use will be not only a methodology to apply in simplifying the work to be done by a computer, but it will come to be an attitude and philosophy in all areas and stages of development as manufacturers and users alike strive to increase the productivity and usage of DP systems.

Bartek is the manager for interactive systems planning for Honeywell Information Systems in Minneapolis, Minn.

Check It Out For Yourself

	TLMS Release 4	Other
On-line updating and inquiry	Yes	—
Alternate logging capability	Yes	—
Protection of scratch and non-scratch status	Yes	—
Audit and inventory reports	Yes	—
Console sharing for multiple CPU's	Yes	—
Automatic scratching of tapes	Yes	—
Simple interface to OS	Yes	—
Scheduling and control of tapes being moved to off-site location	Yes	—
Automatic uncataloging of scratch tapes	Yes	—
Non-quiesing of tape jobs while backing up the master	Yes	—
Unchanged JCL for users	Yes	—
Non-degradation of system performance	Yes	—

PLUS — On-site training and installation — *at no extra charge*

What You Want From A Tape Library System — You Get From TLMS Release 4.

When you want an easier way to do a tougher job.

For more information, write or call:
Gulf Computer Sciences, Inc.
1775 St. James Place
Suite 160
Houston, Texas 77056
Tele. (713) 627-9320

Member SIA Software Industry Association

Line Conditioners Out

SAN DIEGO — Power-Matic, Inc. has introduced a family of alternating current line conditioners.

Eight standard models are available with symmetric or skewed input ranges for wide-range, brownout and overvoltage conditions.

The units range in price from $445 to $505. Additional information is available from the firm at 8076 Engineer Road, San Diego, Calif. 92111.

For Leadership in Communications Management Look to Datapoint

Telephone costs are rapidly becoming one of the largest expenses in the corporate budget. Today's management needs to control this expense.

Datapoint's four INFOSWITCH™ Communications Management Systems cut costs, improve management control and dramatically increase user convenience.

Learn how these tools can control your communications budget.

LDCS–
For Long Distance Control

INFOSWITCH Long Distance Control System is a computer-based telephone management system that can reduce a user's long distance charges by from 15% to 50% and sharply improve authorized phone service in the bargain.

LDCS fits into ongoing telecommunications operations between existing PBX or CENTREX units and outgoing WATS, FX, or TIE long distance facilities. Using least-cost routing, call "packing," a common access number, and other features, LDCS makes any telephone system more cost-effective by directing calls to "flat-rate" facilities rather than expensive direct dialing. LDCS also provides the convenience of speed numbers, optional directory printing, call duration reminder signals, and other features for improved, less expensive long distance telephone service.

For accurate, timely management information, LDCS records vital data (caller identification, number called, duration, cost and others) for each call and issues printed reports in a number of useful formats. Management receives a complete accounting of telephone costs at all levels in the corporation and can accurately "bill back" each department on the basis of use, even for flat rate services. The result is shorter, more efficient business calls, reduction of personal and non-business calls and more efficient use of telephone facilities.

LDCS is a modular and turnkey system requiring no user programming. LDCS can be configured to cut telephone costs for companies spending from $5,000 to $150,000 per month on long distance charges.

SMDR–
For Local Call Management

Telephone companies around the country are introducing a new pricing that can heavily impact telephone costs. It's called "Usage Sensitive Pricing". This pay-as-you-go message unit billing approach now affects about 40% of the Bell System's 9.3 million business customers. Already New York, Chicago, Los Angeles and other metropolitan areas are billed by message units with more cities due for this approach soon.

What this means to the businessman with heavy metro or local calling traffic is that the short distance telephone charges may soon start to rival the long distance charges. In fact, many companies are now spending $5,000, $10,000 and even more each month on local tolls.

The INFOSWITCH/SMDR (Station Message Detail Recorder) can let the businessman begin controlling this cost. In operation, the SMDR automatically records and stores the caller extension number, duration of call and number dialed of each local or metro area call.

Concise, tailored management reports are then produced that permit each department or cost center manager to see where the telephone budget is being spent. Unnecessarily long business calls and personal calls are curtailed with a direct cost savings immediately apparent.

An INFOSWITCH/SMDR can pay for itself in a few months in companies which are spending over $5,000 monthly.

SHARE–
For Multi-Location Telephone Management.

Many multi-location companies suffer from out-of-control costs, inadequately used telephone facilities and poor communications practices.

These companies typically will have a communication management staff at the home office but not in field locations because of the added expense and other considerations, which means that overall corporate control over phone usage is even more uncertain. Since home office communications management has no effective way to measure the usage of remote telephone facilities and no statistics on calls, the result is higher costs and overall lack of management control.

To solve this problem, Datapoint offers the SHARE System. SHARE places the switching subsystems that actually control the telephone call selection in each field location with the main computer and storage unit at the central office. The overall system is linked together via standard telephone data communication lines.

Under SHARE, central and field offices may be configured to control long distance facilities as well as local or metro area calling. In extended configurations system redundancy is built in for greater reliability.

SHARE is a modular, turnkey system capable of controlling up to 250 long distance trunks in up to 6 locations.

ACD–
Automatic Call Director

For many companies incoming telephone calls represent a primary and most critical contact with a customer or prospect. Whether received via local facilities or via long distance service, these calls must be handled efficiently. A company's image often depends on telephone response and agent handling.

Companies which depend on the incoming telephone call for basic business contact range from corporate giants, such as international airlines, down to relatively small firms such as direct mail catalog sales companies. Typically, calls are received on a variety of facilities such as local lines, INWATS, FX, TIE, and other services. Each of these calls is answered by an agent on key-set instruments.

In a typical call processing center, it's very difficult for the agent to provide fair and equitable service to incoming calls, and customer frustration can mount quickly. With currently used instruments it's impossible to distribute calls efficiently and fairly to an agent force, and very difficult for the agent to determine which call has waited the longest for service.

An INFOSWITCH/ACD can solve these problems. Computer-based and using efficient Datapoint manufactured instruments, calls are routed efficiently to agents, with automatic call queuing and holding messages and music if desired. Calls can be automatically routed to other agents during peak periods accordings to user-assigned groups and splits. Complete management information such as call load, waiting time and agent performance is available through video consoles for instant use.

A highly cost-effective system, the ACD will accommodate a wide range of user requirements.

These four INFOSWITCH systems, based on proven technology and supported by Datapoint's national customer service force, are tangible evidence that Datapoint is the Leader in Communications Management.

For a comprehensive brochure on any or all of these INFOSWITCH systems, fill out and mail the coupon or call (512) 699-7280.

DATAPOINT CORPORATION

The leader in communications management™

Yes, I'd like more information on INFOSWITCH

LDCS_____ SMDR_____ SHARE_____ ACD_____

NAME _____ TITLE _____

COMPANY _____ TELEPHONE _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

MAIL TO: DATAPOINT CORPORATION
Attention: Communications Management Products Division
9725 Datapoint Drive San Antonio, Texas 78284

Independent Memory Can Liberate Budgets

(Continued from Page 41)
ing costs are proportional, the energy savings are over $230/mo.

Further, some independently supplied add-on memory modules may be used as duplex memory. The common approach to configuring major teleprocessing or multiprocessing systems in which uptime is crucial, is to acquire redundant "twin" systems. If something goes wrong with one, the other provides backup. But the equipment cost is doubled. Some independent memories include sophisticated switching features that enable operators to dial out sectors of failed memory, while remaining memory continues to perform its full function. By utilizing an add-on memory of this type, the user can gain the reliability advantages of having two separate CPUs without the high cost of complete processor and memory duplication.

Minis Go Independent

Increasingly, cost-conscious computer users are turning to less expensive minicomputers to trim their DP budgets in specialized applications and "small shops." Here, too, it makes sense to stretch your equipment dollar by shopping both price and performance.

Many of the cost savings discussed here can be achieved through careful selection of non-storage devices, such as terminals, sophisticated communications processors and even complete CPUs. However, one must keep two major considerations in mind.

First, what impact will implementation of any equipment have on daily operations? Will time-consuming and expensive software modifications or conversions be required for successful implementation? Often, the piecemeal device approach to improving performance doesn't really solve the overall problem. Main memory is the only plug-compatible product that is truly software transparent, and that gives users what they need — more available computer power.

Second, how reliable is the vendor? Is his product backed by experience, support and service that are widely recognized and respected in the industry?

The thoughtful user can stretch his DP dollar only by examining all of his equipment alternatives thoroughly and independently. No single solution is appropriate to every problem, and the high cost of good performance doesn't have to be commonplace.

Egan is executive vice-president of Cambridge Memories, Inc.

Data Entry Costs Hinge on People

(Continued from Page 42)
keystrokes per hour day after day. Too bad they hardly ever show up for work. If you could only find some way to improve their attitude about working.

High degrees of aptitude and experience are worthless if you can't get people to show up for month-end closings. Slow, reliable people who can key without many errors are nice peole to have around when you need them. Remember, you can't change attitudes. We are what we are and not much is going to change us. However, if you can find people with good attitudes and aptitudes combined, you've got some winners.

• Incentive — Have you ever heard the comment, "Why should we pay these people an added incentive? They're getting a weekly paycheck; that's enough incentive." Sound familiar?

If you wonder why data entry operators need more incentives, try sitting in an upright position on a hard chair for seven hours, while trying to read some scribbled handwriting, meanwhile straining your eyes to keep pace with an unrelenting minicomputer feeding you requests for more and more data. It's tough work.

It's not like secretarial work for which you can set a personal pace. It's a throwback to the start of the industrial revolution when people were forced to keep pace with steam driven machines. Obviously they get accustomed to the pace, but people today want something more than just a promise of being able to keep their jobs.

Many operators will work more productively when their output is tied to a cash incentive. They can relate to that. For them an incentive bonus is something that makes work bearable.

• Training — Improved training may be the most overlooked technique for increasing productivity. It is the most controllable method in the hands of the supervisor. Training increases skills and productivity. People can be trained to increase their ability to scan and intepret source documents, make better use of the keying procedures and improve their concentration. Training builds skills and morale.

• Environment — Unfortunately for some operators and managers, data entry is still "down in the basement." The department was a nice place to work in 1910 and it hasn't changed a bit since. Too many companies place their operators in an environment which says, "Here is what we think of you and your department."

One of the simplest and fastest methods for increasing productivity is to provide a more productive environment. Simple changes in room layout, better chairs and improving lighting can produce remarkable results.

The fastest method for stretching today's data entry dollar is to consider the above techniques for making data entry operators more happy and productive.

Henderson is editor and publisher of Data Entry Digest, *10522 Ridgeway Drive, Santa Ana, Calif.*

USE FATS TO CLEAN UP YOUR TAPE LIBRARY

FATS will eliminate costly error recovery and wasted computer time due to poor quality tapes.

FATS gives you the information you need to know.

- **Location of the error**
- **Length of all errors**
- **Total number of retries for each tape.**

A detailed report shows which tapes should be:
...cleaned...discarded...stripped

Call or write today for your 30 day trial and compare **FATS** to your **OFFLINE HARDWARE EVALUATOR** or reports generated by **SMF** and **EREP.**

"Makers of FDR and DSF"

INNOVATION DATA PROCESSING

970 Clifton Avenue, Clifton, NJ 07013 • (201) 777-1940

VOLUME KEYPUNCH SERVICE

DATA - MIDWEST
MINNESOTAS LARGEST DATA ENTRY SERVICE
(612) 854-1800

Quality Data at Competative Prices
Keypunch • Keydisc • Typescan • OCR Processing

3050 METRO DRIVE - MINNEAPOLIS, MINN. 55420
A DIVISION OF DATA SYSTEMS INC.

IBM 370's, SWEETENED

If you're in the sugar business, or in the soft-drink business, or in the candy business — or even if you're not — we'd like to show you how available, affordable and helpful an IBM 370 can be.

☐ CSA is upgrading many of its lessees from its existing portfolio of 370 equipment.

☐ The following models are available now on lease terms of one to five years with additional upgrade provisions:

370/168	370/155
370/165	370/145
370/158	370/135

existing equipment can be taken in trade.

☐ All dealings are documented directly with CSA as principal.

☐ Broker and dealer referrals are welcomed and protected.

☐ Please call collect: (617) 482-4671
Marilyn Glazer

Computer Systems of America, Inc.
141 Milk Street Boston, MA. 02109

PDP 11
TURNKEY SYSTEMS AND PERIPHERALS

On-line, Interactive Software Installation and Training

• Gen Ledger • Payables • Receivables • Payroll • • Order Entry • Inventory Control • Others •

Cost Effective Peripherals with Full Service Maintenance

(Many are the same brands used by DEC)

*** INSTALLED COSTS ***
• 200 Megabyte Disk System - $27,500
• Dual Density Mag Tape System — $7,995

TOTAL HARDWARE/SOFTWARE SERVICES FOR THE END USER
dealer and distributor inquiries welcome

American Business Computers, Inc.

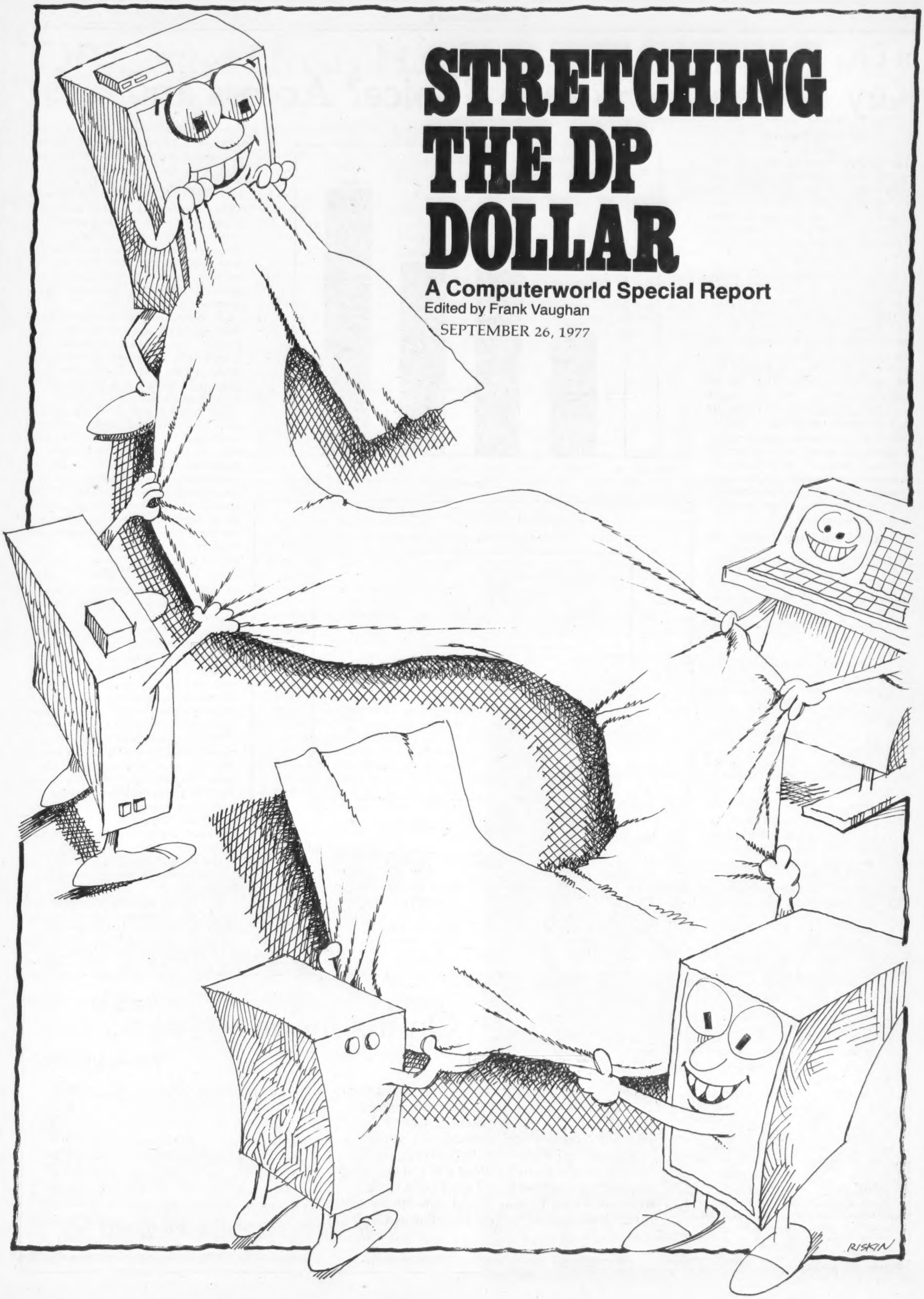
140 N Hwy 288 P.O. Box 936
Clute, Texas 77531 (713) 265-2573

STRETCHING THE DP DOLLAR

A Computerworld Special Report

Edited by Frank Vaughan

SEPTEMBER 26, 1977



V
1
SEP
26
7
7
UMI

In Choosing Magnetic Media

Key Factors in Storage Choice? Access and Cost

By Phillip Ricketts
Special to CW

The correct choice of magnetic recording media for both on-line and off-line data storage applications can save money by improving system performance. The time a program waits for data to appear in main memory is, in part, the visible impact of the media on the system's throughput.

To determine which magnetic media, (magnetic tape, disk packs, floppy disks, cassette/cartridge or some combination of these) the following questions should be asked. How is the storage media going to be used? How fast do you need access to the data? What type of media is the present system compatible with? What are the trade-offs between faster data access and lower storage costs? Finally, are the data storage needs large or small?

When storage requirements are large, magnetic tape generally competes with disk packs. Similarly, when storage requirements are small, floppy disks compete with cassette/cartridges. Therefore, these two categories will be discussed separately.

Large Storage Requirements

Unquestionably, the most popular media for storing large quantities of data off-line is magnetic tape. Comparing tape with disk packs, for example, we can see in Figure 1 that significant cost savings can be realized by using tape in certain applications. Mass production techniques have reduced the cost of this media and large amounts of data can be stored on it relatively inexpensively. Another plus is data interchange. A reel of tape can be easily moved from one system to another. Also, tape provides low-cost data backup.

On the negative side, tape has the basic limitations of slow access time because processing of tape files is done sequentially.

To alleviate the problems of on-line data availability inherent in magnetic tape, disk media is generally used. Fast access rates and high transfer speeds are two major reasons for using disk media. When using disk storage, the data is accessed and transferred in milliseconds rather than seconds or minutes as with tape. Not only is system performance improved, but communications costs are also reduced.

Main Trade-Offs

The main trade-offs, then, between magnetic tape and disk packs are cost/access and cost/bit stored.

Disk media has the superior cost/-access (Figure 2). For example, to locate a random record on a full reel of tape would take an average 72 seconds assuming a 200 in./sec search speed. The time to locate the same record on a full 200M-byte disk pack is only 30 msec, since access time is independent of the location of the record. This high speed is particularly significant if the DP system operates in an interactive or telecommunications environment.

Therefore, disk media is preferred for applications that require an immediate response, as the incoming data enters the system in a random manner. To make use of the rapid response capability of disk, very active data sets are usually put on disk. At one large installation, all data sets that accessed 10 times or more per day and are less than .300K bytes in size are put on disks.

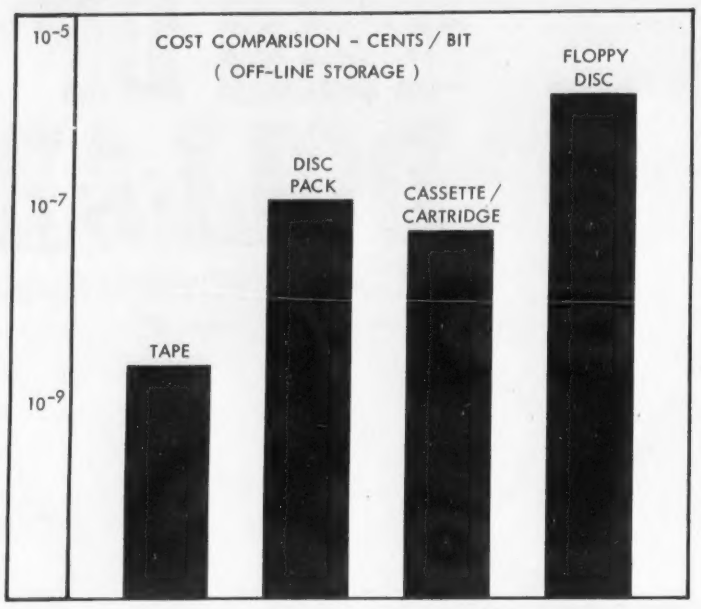


Figure 1

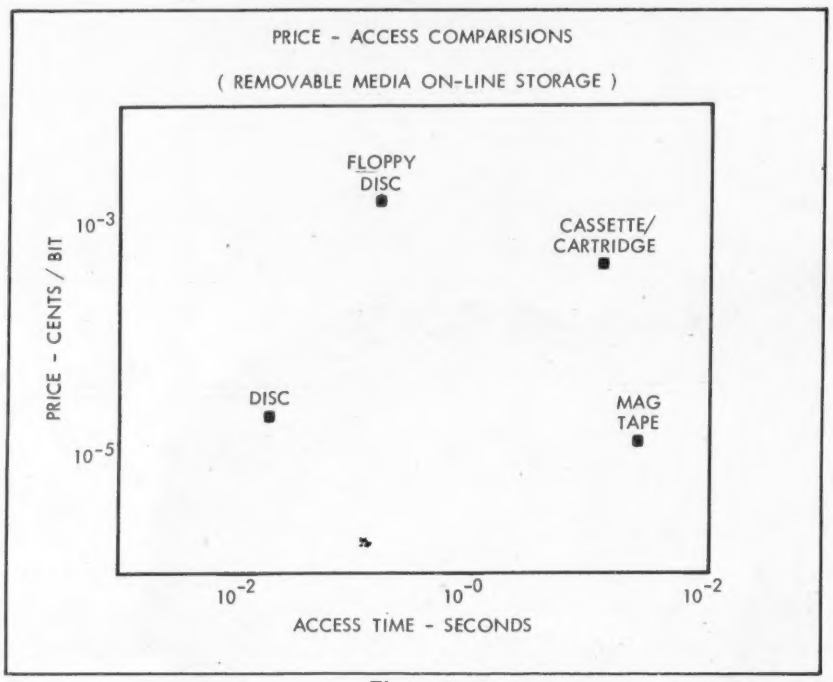


Figure 2

Tape media has a lower cost/bit stored than disk media. A typical reel of tape costs about $12, whereas a disk pack of equal capacity costs about $500. Therefore, tape is the preferred media when each record in the file needs to be read and worked on sequentially. Another plus is that magnetic tape offers the least expensive means of storing data off-line and backing up on-line critical files.

Small Storage Requirements

The tape and disk systems used with large computers are incompatible with small minicomputers requiring a small amount of storage. These large storage media systems can cost more than the minicomputer itself and have much more storage capacity than required by small minis.

For applications that require small data storage, cassette/cartridge and floppies are the favored media. The floppy disk is essentially the same media as tape, but it has the form of a disk and is similar to a 45 rpm record in appearance.

The greatest appeal of the floppy disk as compared with cassette/-cartridges is its quick access time (Figure 2) — one to two orders of magnitude faster than cassettes/-cartridges. A disadvantage of the floppy disk is its cost/bit for off-line storage. Floppy media can cost two to three times as much as cassette/-cartridge media for the equivalent amount of storage capacity.

Best Choice

Except where random access is needed, cassettes/cartridges are the best choice. This type of media, due to its small size, convenience and low cost is an ideal media for many small storage applications such as data collection. The advantage of the cassette/cartridge media is that it can be stored more easily and inexpensively (Figure 1). Also, in most cases, more data can be stored on a cassette.

Therefore, for small storage requirements, cassette/cartridge media has the edge for cost and storage capacity while floppies have superior access time. If the application calls for low cost and small size, cassettes/-cartridges are the answer. If fast access is needed, floppy disk media is the best choice.

Whether storage requirements are large or small the key criteria for determining the best media choice is the trade-off for a given application between faster access and lower storage cost.

Ricketts is disk packs products planning manager for Memorex Corp.

On the Inside

Key Factors in Storage Choice? Access and Cost S/2
DP Center Heeds Hardware, People Comforts S/3
Common Sense Can Save Some Cents S/3
DP Audit Can Unearth Inefficient Practices S/4
Take Shortcuts on Road to Software Purchase S/6
Student Staff, Mixed Vendors Aid College Shop S/10
Imagination, Control Can Trim Forms Budget S/12
Structural Design Ensures High Quality System S/13
Importer of Frozen Seafood Nets Bonus Catch S/15

DP Center Heeds Hardware, People Comforts

By Frank Vaughan
CW Staff

NEWARK, N.J. — Companies can and frequently do make costly mistakes when putting up an office complex that has a DP center within its confines. The simple considerations such as where to put the computer cell are not so simple at all. In fact, location should be high on the checklist of major concerns, according to Harry Mahler.

Mahler is a partner in the Grad Partnership, a firm that has designed several hundred DP centers. He underscores the location of the computer cell as perhaps the most important consideration because it affects so many other factors: security, access to appropriate staff members, materials handling, operational efficiency and energy. The well-designed center can actually reduce operational DP costs, he said.

Ideally, the computer cell should be located as centrally as possible within the building, he said. The reason for the central location is that the insulation of computer cells is caused by the density of wall construction and air masses created by the rooms, thus stabilizing the internal environment. This stabilization of internal temperature and humidity is a desirable design goal that can save operating costs if successfully implemented.

Conversely, Mahler discourages utilizing space on an outside wall for reasons of security and because of vulnerability to environmental conditions and changes.

There can be exceptions to the "no outside wall" policy if walls of extra mass are used or if the earth is moved up against the side of the building to create a below ground effect for the computer cell. In both of these cases, the DP center is insulated from the elements and possible security breaches.

Bury the Pride

Companies should no longer pride themselves in showing off their computer systems with a fishbowl-type setup. The ideal location of the cell would provide adequate access to authorized persons and limited access to nonauthorized persons. The location, therefore, has a lot to do with the total security system.

With the large volume of paperwork traffic that accompanies a DP operation, the center should have direct proximity to the materials handling systems. A separate storage facility, with an environment consistent with the DP center, should adjoin the computer cell, Mahler recommended.

The size of the center would be dictated by the number of modules and the amount of hardware, he added.

People Work Here, Too

Many companies are becoming people conscious when planning their facility and this poses the problem of how to provide a pleasant working environment in an essentially windowless center that operates 24 hours a day under stringent security conditions, Howard Horii, another Grad partner, observed.

His solution is to provide a separate lounge as a definite part of the DP center.

There are also some safety standards that Horii indicated must be considered too:

• Fire Protection — The best method is a Halon system which is triggered automatically by a heat or smoke sensing detector and smothers the combustion with an invisible gas.

(Continued on Page S/4)

When Upgrade Seems Inevitable

Common Sense Can Save Some Cents

By Don Leavitt
CW Staff

Stretching the hardware dollar must have its start with a good choice of hardware and the best contractual arrangement available at the time. That's true enough.

The stretching can continue, often very effectively, through the use of hardware and software monitors, program code optimizers and other tuning tools, especially if the programmers learn the lessons put before them by the optimizers so that their code becomes more effective and efficient, even without the extra loop of "tuning" it before it goes operational.

There have been numerous instances, by now well documented, showing that monitoring what parts of the system are being used, or alternatively underused, has led to better balanced and often heavier workloads on the existing equipment. It has also led to the return of whole subsystems of peripherals, for example, so that the current work ends up being done very effectively on a smaller, less expensive system.

Certainly a number of installations have gone the route of assessing just what they had on their computers and what value, if any, it had for the organization's purposes. By offloading applications that no longer warrant the use of computer resources — if they ever did — and by sharpening how the remaining programs operate, these users have held the line stretching the life of what had seemed saturated hardware.

Each of these approaches clearly should be part of prudent management. There's little you can logically fault in any one of these ideas. But the fact is that even after they've all been tried and used to their fullest, tuning and monitoring and "do we really need that?" just can't get any more capacity out of a system.

Then is the time when an upgrade, or another CPU, or more memory or something is justified, right? Maybe, but then again, maybe not. There is a story that has gone the rounds of some DP circles — it happens to be true: I know at least one of the people involved — that shows how well just plain common sense can fit into the picture when all else fails.

In this instance, the installation was a large one by almost any measure. It had a pair of IBM 370/168s, or something in that same range, and was supporting a substantial national and/or international data communications network.

But the support was fading and supervisors were getting worried. Turnaround time, which had been at some quite comfortable level, had reached five and a half hours and that was not acceptable to this user com-

(Continued on Page S/11)

COMPUTER DISASTER.

95% of the computer contingency/recovery plans surveyed failed to work.

Would yours?

This startling fact has been revealed again and again in our review of the computer emergency recovery plans of many of the nation's top corporations. In our role as an independent computer security consulting firm for over 250 major companies, we have also found that only a few have even undertaken a formal risk analysis survey.

Considering what's at stake, perhaps you'd like to know more about our services. They include risk analysis, data security, physical protection, emergency/recovery plans, theft and fraud control as well as facility design. For more information contact: J. C. Matlock, Jr., Dept. C, 235 Northeast Loop 820, Hurst, Texas 76053, (817) 589-2244.

DATA PROCESSING SECURITY, INC.
New York Chicago Los Angeles Dallas/Fort Worth

New!

MANUFACTURING DATA CONTROL SYSTEM

FRONT TO BACK DOOR CONTROL IN REAL-TIME

- LABOR REPORTING
- STOCK LOCATION
- ORDER ENTRY
- RECEIVING
- INVENTORY CONTROL
- WORK-IN-PROCESS TRACKING
- SCALE INTERFACE
- ENERGY MONITOR/CONTROL
- MACHINE MONITOR/CONTROL
- DISC FILE MANAGEMENT

CUSTOM TURNKEY SYSTEMS

SIERRA RESEARCH CORPORATION

247 CAYUGA ROAD • BUFFALO, NEW YORK 14225
TELEPHONE (716) 632-8823
ASK FOR BROCHURE ML-170C

And Promote Wise Spending

DP Audit Can Unearth Inefficient Practices

By Richard W. Lott
Special to CW

An audit of the computer operations may be used to increase the economic value of DP. It is well documented that the top management of organizations has not paid proper attention to DP operations and this lack of attention provides room for such practices as incompetence, empire building and covering for others. If there is no incentive or reason for DP operations to spend wisely, then they may not.

Following are four true examples of inefficient practices that were detected by DP audits. In one company, a four-hour computer run was interrupted by the company president who required that a special report be run immediately. The special report was run and the original job was restarted from the beginning. The DP personnel had never heard of the use of checkpoints to permit a restart at the point of the interruption.

Second Case

In a second case, a company never made a serious study of the economics and practicality of having a service center process its payroll. With a brief statement that "it wouldn't be respectable to hire outsiders to do payroll when we have our own computer," the company just went ahead doing the payroll itself and thus failed to computerize some "bread and butter" applications that would have had a significant impact on profits.

A third situation involved a company that had leased keypunch machines for 18 years. The justification for doing so was the reported ability to replace the machines quickly if new models were developed. The real reason for leasing so long was that the firm had cumbersome procedures for buying capital equipment. The manager was just taking the easy way out with no regard to the financial impact on his employer.

Another example involved a company that had a rerun rate of about 15%. The rerun situation had been with the firm at that level for so long it was a way of life — almost a joke. An auditor made a careful analysis of the rerun situation and determined that much of it was due to poor preparation of source data.

Unfortunately, most of the company's control procedures started at the point where the raw data entered the computer center (essentially at the keypunching stage). Manual procedures had never been considered a part of DP operations, and since the internal customers were being charged for all the DP costs without much caring about them, DP had never bothered to solve the problem.

Two Obvious Problems

Once top management recognizes its exposures due to a possible mishandling of DP operations, it is in a position to determine whether to invest in DP audits. Two obvious problems are whether an audit will be worthwhile and finding a competent auditor. Perhaps there will have to be an actual trial run to see if some problems will turn up; certainly management should be able to develop a list of several application areas that have potential.

An effective DP auditor is one who has both the inquiring mind of an auditor and much of the skill of a DP specialist. Perhaps it is best to hire this person on an *ad hoc* basis until it is certain that a full-time effort can be justified.

The final point is that management should not assume the DP side of the house is performing efficiently. The use of a DP audit is one method by which management can help assure itself that the organization is getting a fair shake.

Lott is a faculty member at Bentley College, Waltham, Mass.

Ideal DP Center Heeds Hardware, People Comforts

(Continued from Page S/3)

• Interior Security — Corridors used by employees during nighttime or off hours to get to the DP center must be well-lighted and security controlled.

• Parking — Again, because of the sometimes 24-hour operation of DP facilities, nighttime parking can be a hazard. Safe and well-lighted parking areas should be designated for DP personnel as close to the building as possible.

Other possibilities for improved efficiency as well as comfort are proper lighting, heating and cooling and carpeting, Horii said.

The ideal light fixture creates no glare, Mahler said. He compared the desired effect with the lighting people enjoy while sitting under a tree on a sunny day. The trick is to lower wattage per square foot, thus reducing energy consumption, while maintaining the proper quality of light.

When looking at heating and cooling, it is important to note that it is more efficient for the equipment to blow air through the flooring than from overhead, Mahler pointed out. This way, cool air can be delivered to the equipment and occupational areas first before reaching the full height of the human comfort zone.

In one project Grad designed with consulting engineers Jaros, Baum & Bolles for New York Life, they were able to devise a heat recovery system which used the heat generated by the mainframes, various mechanical systems, lights and body heat of the employees to heat the entire 400,000-square foot building. In fact, the boilers did not have to be turned on even in this past deep-freeze winter, he claimed.

INFORMATION
...makes it happen

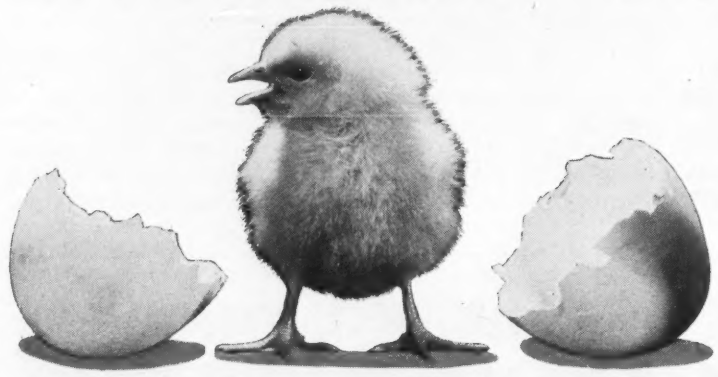
Today, business success demands fast decisions. And fast decisions require decision making information on demand. INFONET delivers it!

INFONET's international remote computing network places full service data processing — full service information — at your fingertips. In data management, financial and business management systems, and the management sciences, INFONET provides the superior decision information tools that give you the "plus" advantage.

Thousands of subscribers around the world have discovered INFONET's "information machine." To learn how it can help you, call or write Box C

INFONET
A Division of
COMPUTER SCIENCES CORPORATION
650 N. Sepulveda Boulevard
El Segundo, California 90245
(213) 678-0311

dc
SIM-14™.
It'll give your 1401 program* a new lease on life.
dc



• AMDAHL, CDC, ITEL users...SIM-14 means *no re-programming!*
• IBM 360/370 135 to 3033 users ...SIM-14 means running multiple programs *simultaneously!*

If your 1400 series program has grown old, let our simulator give it a shot in the arm with features like...

...a self-relocating problem program that's completely interruptable; no hardware restrictions other than decimal arithmetic set; no control storage or micro codes; support for 1400 utilities and sort replacements...

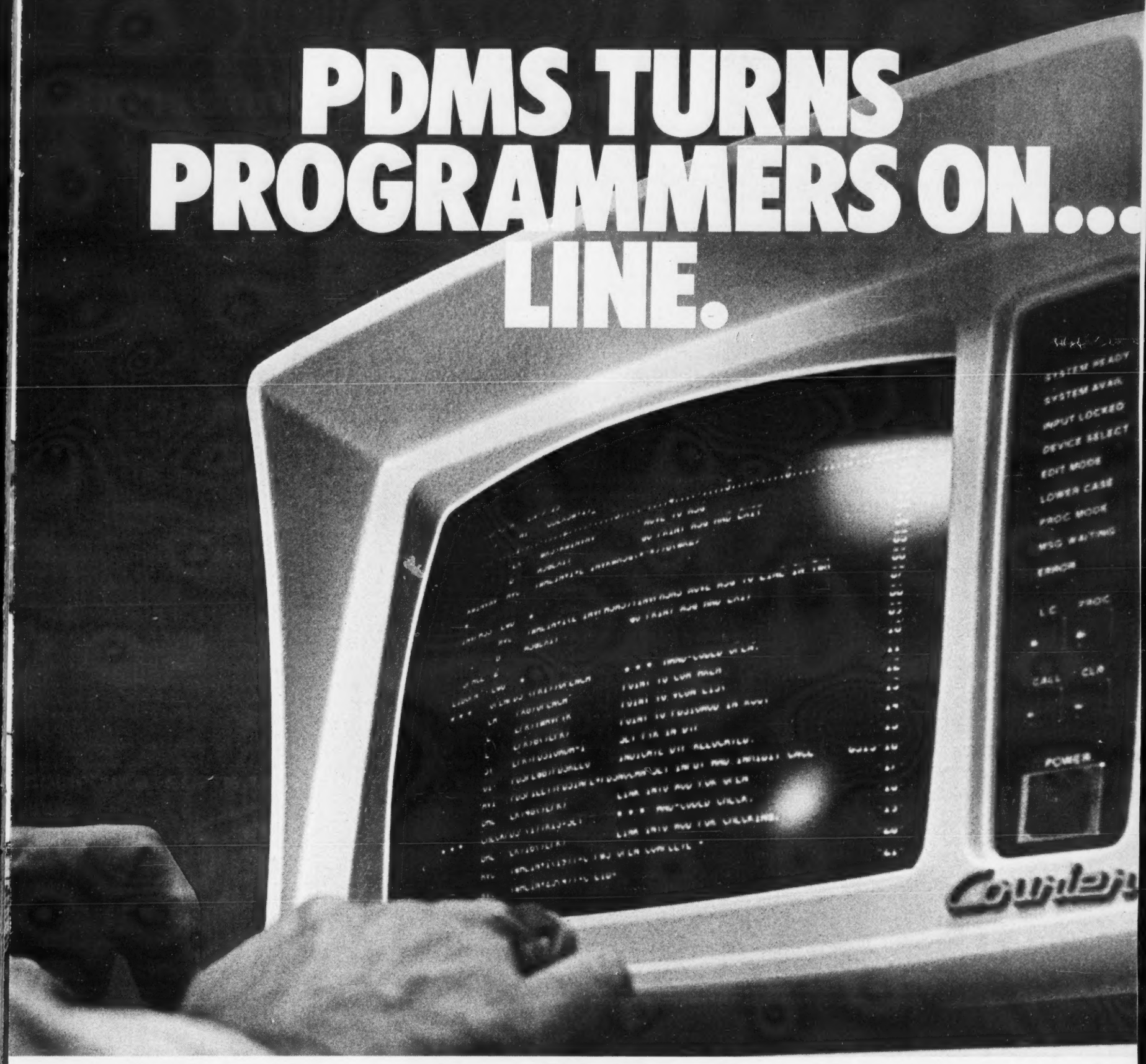
And more. Enough, in fact, to fill a 26-page manual. To get your copy—*and to find out how "cheep" SIM-14 can be*—call your nearest Dearborn office.

***Includes 1440 and 1460 programs**

dc **dearborn** computer company | dealer-IBM computers systems software leasing

1460 renaissance drive/suite 400/park ridge, illinois 60068 (chicago)/(312) 827-9200
toronto (416) 621-7060 • st. louis (314) 727-7277 • houston (713) 965-0788
member, CLA; ADAPSO; SIA

PDMS TURNS PROGRAMMERS ON... LINE.



PDMS/Program Development and Maintenance System is an extremely powerful extension to the DOS programming environment.

PDMS provides capabilities never before available to the DOS community.

Designed to increase productivity and reduce overhead, PDMS consists of an OS type partitioned data set library, a comprehensive set of commands to manipulate the library and its contents plus support programs to interface with the library in a batch and on-line conversational mode.

The system, which contains a terminal monitor eliminating the need for CICS, provides an exciting programmer work station environment by extending the computer facility to the programmer via 3270 type video display terminals. This allows all programmer development, maintenance, test and documentation functions to be performed in an interactive mode without leaving the work station.

The PDMS library may contain source programs, relocatable object modules, job control statements, test data, tables, text for documentation or any group of logically related records. These records may be scanned and modified by a comprehensive set of easy-to-use commands.

Functions such as:

- Add, Change, Delete statements in place
- Scan for and/or Replace character strings in place
- Scanning, Copying and rearranging source
- User program access to the library... verify data, load control tables, etc.
- Direct interface with Assembler, COBOL compilers and link edit
- Password protection limits access
- History of activity
- Lock/Unlock facility...for production programs

PDMS SETS A NEW STANDARD IN OPERATIONAL USE

- No need to condense ever...space is reused as soon as it is made available
- Single library concept...greatly simplifies source and relocatable maintenance functions
- Concurrent library updates...multiple partitions and processors
- Ease of Implementation...no conversion

PERFORMANCE

User acceptance has been enthusiastic and productivity improvements immediate and dramatic.

INEXPENSIVE

PDMS is available in the DOS, DOS/VS, and EDOS environment for $110.00 per month for the batch version or $260.00 per month for the on-line system.

Please send me your new PDMS brochure

Name _____

Title _____

Company _____

Street _____

City _____ State _____ Zip _____

Telephone _____

THE COMPUTER SOFTWARE COMPANY
6517 EVERGLADES DRIVE, RICHMOND, VA 23225, 804/276-9200, TELEX 82 83 94

Cincinnati • Dallas • Los Angeles • Minneapolis • Australia/EDOS • Australia Pty. Ltd., Hurstville NSW, 587-3127 • Sweden/Stalund Program AB, 018/38 62 59 • Switzerland/Howeg-Data AG, 065/51 21 51

Take Shortcuts on Software Purchase Road

By Donald R. Landgraf
Special to CW

Reaching a final decision on buying software is not fun, as people who have been on the "magical technical tour" well know. Many times, even the final results aren't fun either.

It is agonizing to spend great amounts of time to end up with a software package that doesn't exactly meet the specifications of the job at hand. It is many times more agonizing to try to write a system that is perfect, however, and that is why the software was purchased to begin with and why the shortcomings are tolerated.

In recent years, a common methodology has developed for the evaluation and acquisition of proprietary software: identify your need, scour the directories for possible solutions, write vendors for literature on products, schedule presentations with those with the most promising literature, evaluate the products in the final running and make a final purchase decision.

This whole process is a narrowing-down escapade with the ultimate purpose of finding the best package to meet a need. The trick of making the search as fruitful as possible is to make the search as short (inexpensive) as possible, but without sacrificing confidence that the end product is the best available.

There are some shortcuts and information gathering techniques that you can use to shorten that software acquisition cycle with greater confidence that your final choice is the right one. You still have to identify your need and survey the catalogs for the choices available. These suggestions are intended to shorten the narrowing-down process.

'Knockout Factors'

The first shortcut comes into play shortly after you have identified your need for a specific software solution. It is called "knockout factors," a list kept in mind all through the evaluation process.

William R. Synott, senior vice-president of the First National Bank of Boston, said in his address to the American Bankers Assocation conference in New Orleans, "These are your most important criteria for reducing the number of possibilities you will investigate." Such factors, as outlined by Synott, are the obvious ones of upper cost limit, modifications necessary to make the package run on your machine, amount of core required, payment plans available (if you can't afford large sums of money at once, lease is essential for acquisition), cost of on-site evaluation, hardware/-language restrictions, etc.

Two additional areas of knockout factors should be explored early in the acquisition cycle. The first is the company behind the product. The second is product applicability.

When one is shopping for a home, it is advisable to always look at the basement first before being excited by the wallpaper or the size of the master bedroom. The foundation is what holds the whole thing up.

Software purchasing is no different. The company behind the product is the system's foundation, it should be explored thoroughly.

You are ostensibly purchasing software for a long-term benefit. You are paying a good deal of money for the software to keep up with hardware technology and computing advancements. You want to make sure that is the intention of the company behind the products.

If a company is profitable and successful, that is the degree of proof of market acceptance and stability. These are questions you should ask:

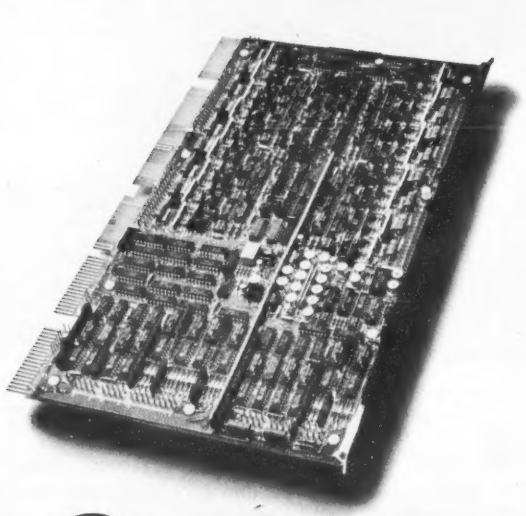
- What is the sales and profitability history of the company?
- What is the Dun & Bradstreet credit rating of the company?
- How old is the company?
- What user organizations exist for the products?
- How widespread is the serviceability? Local? National? Worldwide?
- How many products does the company sell? How many are on the Datapro Honor Roll of Software?

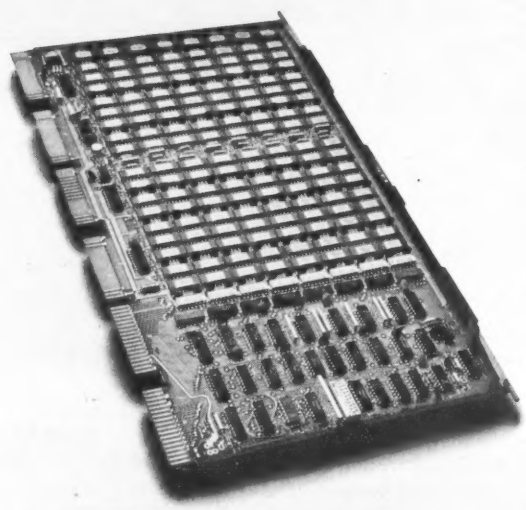
Assuming the company behind the product looks sound enough to grow with your DP needs, it's time to ask some pointed questions about the product itself. Try these for starters:

- What is the product's enhancement record? This will tell you just how well the product is keeping up with technology.
- Is there a maintenance fee for this product and, if so, what do you get for maintenance? There should be a healthy list of services supported by maintenance dollars "support" as an answer is not enough.
- What kind of technical support is there? Telephone only? Is there a periodic problem reporting system?
- How good is documentation and how often is it revised? Documentation is never perfect, but vendors who strive to approach perfection have your best interests at heart.
- What kind of training do you get with this product? In general, the more comprehensive a system is, the more training is required. One should expect on-site or personal training of key personnel upon installation with possible follow-up training included as part of the purchase contract. The better the training, the more use the product will get and, thus, the more benefit it will be to your organization.
- How many installations are there of this product. You'll find that the more

(Continued on Page S/14)

One way or the other, you're going to profit from plugging a Plessey 32K memory card into your PDP-11.





One way

The Plessey PM-1132.

32K words of non-volatile core memory on a single plug-compatible card that occupies just two slots in your PDP-11 mainframe. Compatible with either the standard or the new modified UNIBUS backplane. Available with and without parity.

The other

The Plessey PM-S1132.

Up to 32K words of high-speed NMOS semiconductor memory on a single plug-compatible card that occupies only a single slot in your PDP-11 mainframe. Choose a full-complement 32K word card, or one of 7 depopulated versions, then expand in 4K increments as your data storage needs increase. Available with and without parity.

Plessey Microsystems

Either way, you get reliable high-density storage at a refreshing low-density price.

If that's more memory than you need, we also have a full range of 8K and 16K plug-in cards that are fully compatible with your DEC, Data General and Interdata minis. All supported with the backplanes, cables and expansion chassis you need.

And all available now. Contact us today.

Irvine, CA: (714) 540-9945. Los Angeles, CA: (213) 473-4581. Mountain View, CA: (415) 965-1400. Chicago, IL: (312) 671-4554. Wheaton, MD: (301) 949-1664. Boston, MA: (617) 890-2654. Minneapolis, MN: (612) 881-0190. Kansas, City, MO: (816) 444-0166. South Plainfield, NJ: (201) 757-2211. Albuquerque, NM: (505) 294-5790. Dallas, TX: (214) 387-0229. Toronto, Canada: (416) 661-3711.

Ask CONTROL DATA to supply Monolithic Memory for your IBM 370... get reliability you can bank on at half the price.

We have it.

How reliable is Control Data Monolithic Memory? Reliable enough for 15 U.S. banks to use it for critical financial processing with their IBM 370-158's!

And so reliable, more than 320 other U.S. firms bank on it for their 370-135's through 168's.

We've installed more than 450 Monolithic Memories already to help IBM-370 users cut processing costs. And our users are our best proof that CDC Monolithic Memories work.

If you'd like to talk to some of these users, just ask our Peripherals Representative. He'll supply references! He'll also point out other key reasons for choosing our Monolithic Memory:

Stability. We're not a one-product company. We've been around a long time, and we'll be around for a long time to come.

Single-source responsibility. We can provide plug-compatible, cost-effective CDC disk memory, mass storage, and other peripherals. You place total responsibility in a single vendor.

If you want 370 memory capacity at half the price or double the capacity at the same price ...if you want to save $40K to more than $500K ...ask us about CDC Monolithic Memory.

And ask us about the users who have proved it works. Call your local Control Data Marketing Office or mail the coupon today.

Mr. James Kuntuzos, Sales Manager, Peripheral Product Sales, Control Data Corporation, P.O. Box 1980, Twin Cities Airport, St. Paul, MN 55111. Dept. CW-9267

Please have a Control Data Marketing Representative supply further information about your Monolithic Memory.

Name_____ Title_____

Company_____ Area Code_____ Phone_____

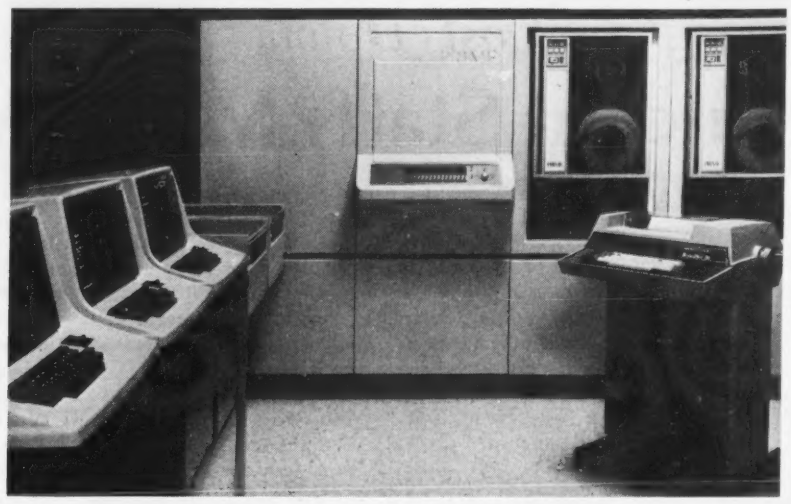
Address_____

City_____ State_____ Zip_____

Ask Our Peripherals People

CONTROL DATA CORPORATION

To the computer evaluator more interested in saving kilobucks than storing megabytes:



If you want to increase computer productivity and at the same time cut computer costs, Prime can help. We offer a compatible family of computer systems equally adept at interactive data processing and computational timesharing. Systems that provide a CODASYL-compliant DBMS for sophisticated data management applications. Systems that can handle specialized applications with software like MUMPS and SPSS. Systems with number crunching performance in the same league as the 370/158. Systems that process more megabytes for fewer kilobucks than you ever thought possible.

Sure, some people pick Prime computers because they provide up to 8M bytes of main memory, 512M bytes of virtual memory, and 2.4 billion bytes of disk storage.

And others choose Prime because our PRIMOS operating system supports up to 63 simultaneous users programming in any mix of FORTRAN IV, COBOL, BASIC and RPG II.

Still others select Prime because our high-performance Prime 400 and 500 systems can run very large, multi-megabyte programs without gimmicky programming, and at speeds that rival many larger systems.

But ultimately they all put Prime first because our computers deliver mainframe functionality at a fraction of mainframe cost.

Find out how a Prime system costing from $100,000 to $350,000 can give you results you thought you'd have to pay up to 10 times more to get. Contact J. D'Angelo Marketing Manager, Prime Computer, Inc., 40 Walnut Street, Wellesley Hills, MA 02181, (617) 237-6990.

PRIME

Prime can help

Help Keep Costs Down

Student Staff, Mixed Vendors Aid College Site

By R. Waldo Roth
Special to CW

UPLAND, Ind. — Taylor University here has used a variety of methods to keep the cost of its instructional administrative computing center down during the 10 years the center has been operating. These methods have included mixed vendor hardware, in-house software and maintenance, student staffing and several do-it-yourself projects.

When the university's original Digital Equipment Corp. PDP-11/40 time-sharing system was purchased five years ago, it was a total DEC system with the exception of the Teletype Corp. Model 33 ASR terminals which had been obtained from a second source, Com-Data in Chicago. As time went on and the management of the center became more sophisticated and experienced, additional needs were met by evaluating alternate sources for each new hardware item. These purchases included CRTs, large-capacity disk drives, add-on memory from two separate vendors [CW, July 18] and printing terminals.

An additional way in which hardware acquisition costs have been minimized is that peripherals already in use on the school's earlier General Automation Corp. 18/30 batch system have been adapted to the DEC time-sharing system by obtaining either controllers or interfaces existing on the market for these purposes.

The first experiment of this type was to purchase an asynchronous data line from GA so that the system could be accessed by the DEC time-sharing system. In time, an in-house modification permitted the printer to be accessed from either computer system by changing a switch.

This success led to the purchase of other interfaces: An MDB Systems interface that allows the Wang Co. tape drive originally purchased with the GA system to become a permanent part of the time-sharing system.

It should be pointed out that these modifications have not all been made simply and easily, but with good in-house know-how and some vendor support they have all been successfully completed. Taylor is still looking for and pricing interfaces for its Calcomp 565 plotter so that it too can be attached to the time-sharing system.

Software Operations

Although most of the Taylor software to date has been written in-house, the purchase of a data base package from Educomp was helpful in bringing some administrative applications up on the time-sharing system. This package has been greatly enhanced and upgraded by the staff in the center.

Most instructional software has been obtained for reproduction costs or slightly more from educational software houses and other colleges and universities. However, certain instructional packages have been written by faculty and students in-house, including a package for drill and practice in music intervals and chords written this summer by two faculty members — one in music and one in computer science.

The original time-sharing system was on a maintenance contract for the first two years with DEC. However, it was then decided that one physics faculty member — given some release time from other duties — plus the computer center director, John Kastelein — formerly an electrical contractor in the Houston area for three years — could maintain most of the system. DEC has continued to be available on a time and materials basis and has been most cooperative.

The system has now grown to a point that the center is considering other possibilities for maintenance — hiring of a maintenance person, sharing a maintenance person with one or more other installations or contracting with a multiple vendor maintenance house.

Student Staffing

Students have been successfully employed in the center since its 1967 beginning. They have been utilized in a variety of capacities such as data entry operations, software development (administrative, instructional and auxiliary enterprises) and instructional support. Although effective in most areas, they have been of the greatest assistance in converting administrative software (during the summer) and providing excellent laboratory support for students using the center and learning about computing.

During these 10 years, the student assistants have been available for over 40 hours per week during evenings and Saturdays. They have also assisted in teaching a noncredit course for high school students.

Another way of utilizing students in a learning environment, but not yet put into effect, is the concept of "contract programming." Students would read a set of program specifications prepared by the center and submit bids based on the number of hours they would estimate it would take to do the job. The low or best bidder would be contracted for the software. If the student's bid was significantly off in either direction, the contract

(Continued on Page S/11)

lease your computers for less...

For qualifying companies, it may be possible to lease computers and peripheral equipment at rates that are well below prime. That's why it's important for you to talk to us at General Electric Credit Corporation before finalizing any decision on financing or leasing new EDP equipment.

With over $3 billion worth of equipment on lease, we have the know-how and experience to help you arrive at the right leasing . . . or financing . . . decisions.

Because of our size, we're able to apply the same care and dedication to every transaction regardless of size. Whether it's a custom-tailored lease to acquire equipment or a National Vendor Program to help create more sales.

Our resources enable us to be in the market at all times. And we have offices nationwide . . . so, we're easy to reach . . . easy to deal with.

You'll find it makes good sense to talk to us first.

To: Mr. John J. Canning, Marketing Mgr.,
Equipment Leasing
General Electric Credit Corporation
P.O. Box 8300, Stamford, CT 06904 • (203) 357-4597

Dear Mr. Canning: I would like more information about GECC's customized leases.

Name _____ Telephone _____
Title _____
Company _____
Address _____
City _____ State _____ Zip _____

ATLANTA (404) 451-5921, BALTIMORE/WASH., D.C. (301) 997-4990, BOSTON (617) 272-8540, CHICAGO (312) 858-8650, CLEVELAND (216) 842-6333, DALLAS (214) 234-0648, HOUSTON (713) 661-7106, LOS ANGELES (213) 572-5317, MEMPHIS (901) 522-9565, NEW YORK CITY/NO. N.J. (201) 825-3105, PHILADELPHIA/SO. N.J. (215) 923-2817, PITTSBURGH (412) 923-2520, SAN FRANCISCO (415) 537-2234.

General Electric Credit CORPORATION

Administrative Offices:
Stamford, Connecticut 06904 • (203) 357-4597

Common Sense Goes Long Way to Save Cents

(Continued from Page S/3)

munity or to the DP management.

The computer work had long since been reviewed and found vital to the organization. It had been tuned and optimized till it just couldn't be handled any more efficiently.

To all appearances, the CPUs were saturated and the only solution left was to get another mainframe. The cost/justification was all worked out, passed up to the management committee and, depending on which version of the story you hear, the people from on high perhaps reluctantly agreed to seek a third 168.

But there was one last lonely staffer who still wasn't convinced. He had done some good performance analyses in the past, so when he asked for one more chance to "check something" before the requests for proposals were sent out, management gave its okay.

The analyst just couldn't accept the idea that a five and a half hour turnaround was caused by saturated CPUs. So he started timing how long jobs actually were in the computer, from entry to completion.

The actual numbers have been lost in the tellings of this tale, but they were in the range of five minutes or 5% of the total time. Small enough, in any case, so they seemed to confirm his suspicious that the CPUs weren't the bad guys.

Well, he couldn't let things go like that. Even if he was sure the CPUs weren't at fault, the installation still had bad turnaround time and there had to be a reason for that. He'd better find the real cause of the problem if he really wanted to head off the acquisition of another 168.

So he started timing all the steps in the cycle from the time the user submitted the request or the work to the time the desired output was returned. Everything was stop-watched, from pickup and delivery times, to data preparation, to computer room time, to time for printing, then collating, bursting, checking output and addressing it to the right party.

Without belaboring the story too much longer, he found that just about every phase of the system was working within reasonable limits — except for one. Output preparation — the printing, bursting, etc. — consumed something like 25% to 30% of the total turnaround time.

It wasn't that the people at that station were loafing or weren't dedicated to their work. They were typically working about as hard as any one else on the data center staff, and often a lot harder than those with more desk-bound jobs.

The printers were producing the output fast enough: it was always stacked up higher than any of the workers liked to see it. But they had only one (or two or some too small number) decollators and bursters. That and not the "saturated" CPUs was the bottleneck.

The analyst recommended getting adequate paper handling equipment and the staff to man it properly and forgetting about a new 168.

Unfortunately, a simple solution might be great for the organization, but it can be embarrassing to those who had earlier proposed a grander answer. Obviously, the acquisition of bursters rather than another CPU was a constant reminder to the analyst's managers if not to himself that he was possibly more competent than they.

The atmosphere grew steadily more awkward and ultimately the analyst departed the scene.

Vendor Mixture Helps Cut Costs

(Continued from Page S/10)

could be negotiated.

Of course, this student assistance is not of benefit only to the college. The experience gained by students— some have worked at the center since their sophomore year — has been highly regarded by prospective employers.

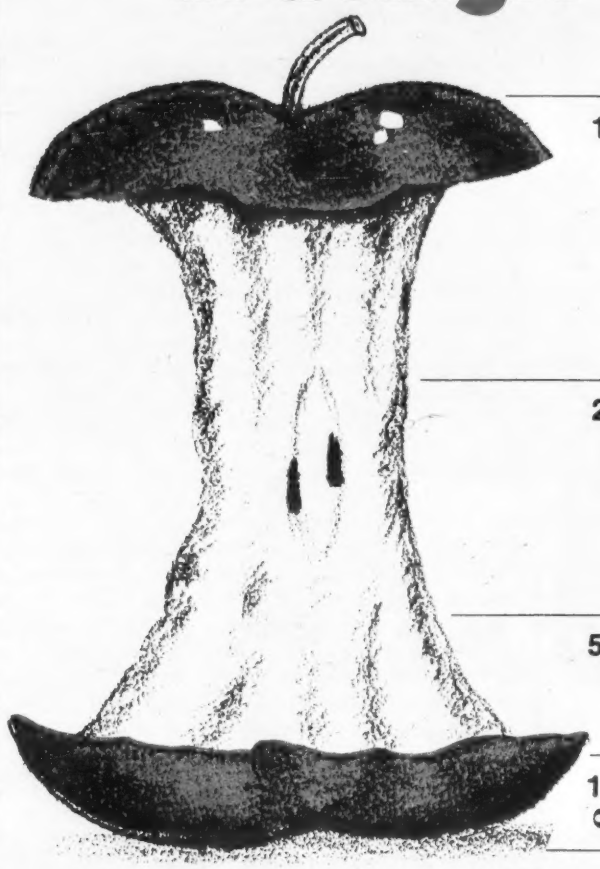
The university has found that hiring its own graduates as full-time programmers has its benefits also. They are familiar with the system and can become fully productive in a short time. Two recent graduates are currently employed at the college full-time as programmer/analysts.

Roth is a faculty member at Taylor University.

dc

Get 3 to 10 partitions + from a single system at a single low price.

dc



128K Core
- Resident Directory Support
- Automatic Volume Recognition
- Generic/Referral Assignments
- Power III™
- DASD Space Management
- 255 LUBS Per Partition
- Cataloged Procedures
- Relocating Loader w/CIL Compression
- 2x40K Batch Partitions

256K Core — All of the above plus...
- Resident Transient Support
- CRT System Console
- Partition Load Balancing
- SET™ Performance Measurement
- Disk Chained Fetch
- 3x60K Batch Partitions

512K Core — All of the above plus...
- Resident Access Methods
- Job Schedular
- 6x50K Batch Partitions

1024K to ∞ Core — All of the above plus...
- 8x100K Batch Partitions

IBM Users: Dearborn's DOS/RS™ is all the software you'll ever need, no matter what your core size...128K to ∞

At last...growth potential for your S/360 or S/370 with the latest version of Dearborn's Operating System/Real Storage.

DOS/RS is the single, fully-integrated system with total capabilities written into it—from the outset—to let you improve throughput beginning with the most modest core size right up the scale to 1 Mg...and beyond.

DOS/RS is the major enhancement of DOS Releases 26 and 27 that improves, extends and helps evaluate itself...without combining several different systems...without adding or modifying an existing system...without maintenance problems...without added costs.

DOS/RS improves 360/370 performance without installation and conversion problems. Installation is quickly accomplished in an orderly manner since all standard DOS functions are supported. What's more, many DOS/RS features will begin operating automatically. Then, as your core size and requirements increase, DOS/RS permits a gradual, phase-by-phase conversion to total DOS/RS capacity.

VISAM—a direct replacement for ISAM

Dearborn's new Variable-Length Indexed Sequential Access Method can be added to improve processing throughput and utilize disk storage more efficiently.

For detailed information on the all new DOS/RS and VISAM, call the nearest Dearborn office or write:

dc dearborn computer company | dealer-IBM computers systems software leasing

1460 renaissance drive/suite 400/park ridge, illinois 60068 (chicago)/(312) 827-9200
toronto (416) 621-7060 • st. louis (314) 727-7277
houston (713) 965-0788

Member, Computer Lessor Association; Association of Data Processing Organizations; Software Industry Association

Imagination, Control Can Trim Forms Budget

By H. Frank Coffman
Special to CW

When top management sends down the word that the forms budget must be stretched, where do you start?

Forms probably account for the largest single supply budget item, but you need them — for recording, for reporting, for testing, for all the jobs that must be done for all the other departments. And if your forms are now being purchased at the lowest price possible, how can you stretch this budget any further?

The key phrase here is "lowest price possible," and the answer to the question posed may well lie in how you and/or the director of purchasing understand forms costs. The money you pay the vendor is but one element of forms costs and probably the smallest one at that.

There are a number of other factors that contribute to the complete cost of forms and their usage. So there are probably many ways in which you can reduce the seemingly irreducible cost per thousand forms. It all comes under the broad heading of forms control, which is not, contrary to popular opinion, simply inventory control.

If you really want to get more for your money from forms and stretch that budget to meet management's request, it would be worth your while to take a closer look at your total forms costs. Here are a few guidelines to help you get started.

While stock forms constitute the greater volume in your area, the custom-designed documents eat up a larger portion of the forms budget. Nevertheless, there are ways to save in both areas.

More Lines Per Inch

Most companies have established their price levels for stock forms and, order by order, bids will vary little over a period of time. But there are possibilities, primarily through reducing the quantities you need to buy and small gains here and there can add up significantly over a year's time. Printing eight lines to the inch, for example, instead of the normal six, can really make a dent in the volume of stock forms being used. The programming changes are usually minor, little readability is lost and you will gain considerable printing space.

Another suggestion is to make use of both sides of single-copy stock forms for running tests and similar one-shot operations confined to the computer room. Instead of tossing several hundred pounds of paper into the bin, turn the forms over and use them again.

It could be advantageous to check the usage of the multiple-copy stock form reports that are prepared daily. Are all copies really needed? This may be a sensitive area and require diplomacy on your part, but our experience has shown that in many cases, report copies are simply thrown away without even being looked at. The need that may have been real at one time has long since passed and no one bothered to advise the DP department.

Give some thought to using lighter weight papers in stock forms. If you're currently getting 20 pound stock, check into the possibilities of 15-pound.

Now look at those more expensive forms, the ones that must be designed to meet specific requirements. They range from payroll checks to customer status analyses, from purchasing paperwork to production reports. They also include any number of special effects like magnetic ink or optical character printing, die-cuts, perforations and so on. They also come in a wide variety of sizes, styles and plies. It's easy to get lost in this jungle if you are not familiar with the terrain.

There are so many possibilities here that we must confine ourselves to the major ones (and the prime consideration is experience in this field).

Print Cycle Analysis

A good starting point is with something called Print Cycle Analysis [CW, Jan. 17]. The basic idea is to design those expensive forms so they require less time on the high-speed printer. This is done by eliminating spaces between print lines, rearranging print lines that have the same data, combining print lines, printing documents side by side and in other ways. The details should be reviewed.

Inventory control is basic to budget control. You must know what you have on hand, what you will need in the near future, how to get needed forms fast and so on. Without an organized approach, however, there are many traps into which you may fall.

It is well-known, for example, that the longer a printing run is for a forms manufacturer, the lower the per thousand cost of the form. This, unfortunately, leads many companies to order a year's supply of a form, sometimes two or three years, in order to get a price break. Then the inevitable happens and the forms must be changed in one or more aspects and you are stuck with thousands of obsolete forms plus storage costs that constitute complete waste.

On the other side, there is the danger of not ordering enough or failing to keep adequate records of usage. Suddenly you run short of a form and have to order it on an emergency basis. This is usually costly.

How can you order, say, a six-months' supply of a form and still get a volume price break? The answer to this lies in something called grouping. This requires a complete review of all forms with the object of redesigning them to standard sizes, the fewer the better. You may be surprised at the wide variety of form sizes you have and how easy it can be to standardize on three or four sizes. These can then be ordered all at the same time to obtain the desired volume price break.

Ordering for price breaks through grouping of sizes also requires the standardization of order dates. Some old forms destined for standardization may be in surplus: others may be running low.

Of necessity, the grouping objective carries with it the need to redesign forms, and while striving for size standardization it can be profitable to include other elements of design or redesign aimed at cutting costs. As in the stock form area, determine if all the copies printed are actually needed and look into printing eight lines to the inch so form sizes can be cut.

The number of copies acquired is particularly important when dealing with high-speed printers. Depending on the model, a printer usually has a limit as to the number of copies it can accept and still give readable impressions on carbons. Very often the DP department finds it has to run the same form twice because too many copies are needed. If the quantity cannot be reduced, then think about the possibility of having the form produced in a side-by-side or two-wide configuration.

There are many other design ideas that can help either bring a form into standardization with others or simply reduce its size to use less paper. Consider the possibility of back-printing.

Another ploy is to redesign a form to do double or triple duty. This is a very good possibility with reports. In many cases the differences in the data to be accommodated on various reports are small. A good forms designer can produce a form that may be used for a variety of reports, even if column widths differ.

These are just a few of the ways and means available to the DP department head to reduce costs in the forms area. Many companies have found that for years they have been missing a good bet and that cuts of upwards of 10% or more in annual forms costs are quite reasonable to expect if they are organized and are able to approach the problem correctly.

Coffman is the manager of continuous product marketing for the Standard Register Co., Dayton, Ohio.

LOCATE EVALUATE **MINICOMPUTER SOFTWARE**

–NOW TWO VOLUMES–

MINICOMPUTER SOFTWARE QUARTERLY
WITH
·Over 500 detailed program descriptions
·Indexed by: Application — Hardware — Language

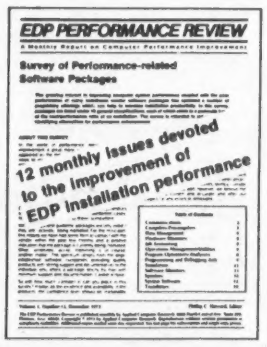
Subscription Includes:
Base Volume Set + 4 up-dates
$85. US/Can (+5% Tax in Mass.)
$110. Foreign (prepaid only)

INTERNATIONAL MANAGEMENT SERVICES, INC.
215 Oak Street, Dept. C, Natick, Mass. 01760

EDP PERFORMANCE REVIEW

The How-to Monthly on Computer Performance Improvement

- Tutorial Reports
- User Experiences
- Products & Services
- Current Literature
- Conferences, Seminars


EDP PERFORMANCE REVIEW
Survey of Performance-related Software Packages
12 monthly issues devoted to the improvement of EDP installation performance

Subscription: $48.00/year
Write now for a free sample issue and index.

ACR Applied Computer Research
P.O. Box 9280, Phoenix, AZ 85068
(602) 944-1589

The Westwood TWX/DDD Modem offers a new dimension in communications compatibility

The One Terminal That Does The Job of Two and Pays for Itself

Now you can feed both TWX and computer telephone lines (DDD) into the Westwood TWX/DDD Modem and Terminal and both lines can be answered automatically without operation intervention ... eliminating the need for a TWX Terminal.

For details contact:

Westwood Associates, inc.
DATA COMMUNICATIONS EQUIPMENT
1442 Broad St., Bloomfield, N.J. 07003 / (201) 338-0200
N.Y.C. (212) 964-3018 Phila. Area (609) 829-7280

ALSO AVAILABLE FROM WESTWOOD:
T.I. Portable Terminals, ASR & KSR Terminals, A.D.D.S.-C.R.T. Terminals, Control Data - Line Printers, Data General - 30 & 60 CPS Impact Printers, DI/AN 120 CPS Impact Printer, DIABLO - High Quality Teleprinter, DMC - Floppy Disk with Microprocessor, Panasonic Badge Readers, Scope Data Teleprinters, Techtran Digital Cassette Recorders, Video Projectors.

Hierarchy of Modules

Structured Design Ensures High Quality System

By Raymond C. Fish
Special to CW

It has long been felt that the only way to design high quality yet inexpensive systems was to design and implement modular systems.

As recently as eight years ago, there was no specific formula or method for designing such a modular system. The only help that was offered to a system designer was ". . . approach the task in a certain frame of mind." Since that time, many firms have implemented modular systems, even though most would probably disagree as to exactly what modular really means.

The current consensus seems to be that a system or program should consist of a group of highly independent single-function modules arranged in a descending hierarchy. The problem is, with few exceptions, no one is able to specify exactly how the hierarchy is derived. Furthermore, given two modular solutions to a user problem, few can actually determine which is the better solution.

'Subjective Process'

Many DP professionals believe there really is no problem at all and that the concept of modularity is, by nature, intuitive. They believe anyone can build a modular system simply by placing each system function in a separate module and by making each module as independent as possible from all the others. Yet when asked exactly how this is done they can only answer that "it's a subjective process."

In fact, the traditional design process itself (modular or not) has always been a subjective process. When presented with the functional specifications for a proposed system, the analyst/programmer will first decide the nature of the system (on-line, batch, etc.), then the procedural flow of the system (how many programs and what they will generally attempt to accomplish) and, finally, the way in which the data will be stored and maintained on the various files.

Once these decisions are made and documented, the general design is considered complete. The detail design phase can begin and the team can decide exactly how each program should be constructed in order to achieve its purpose.

The traditional nonstructured "modular" design is better than no design at all, but results are often less than satisfactory. The project team seldom delivers the system on schedule, the user feels the system does not accomplish all it intended to accomplish and the maintenance programmers are immediately saddled with a system that is difficult to maintain and modify.

What we need, therefore, is an approach to formal design which will produce structured modular systems that are inexpensive to develop, highly reliable and easy to maintain or modify.

This approach will have to describe the exact procedure for defining a system as a hierarchy of modules. It will have to specify criteria for judging how strong (or single-functioned) each module is and criteria for judging how independent the modules actually are. Such an approach has been formulated and it is called structured design.

Relationships Analyzed

Structured design is concerned with both the relationship of the pieces of the problem to the pieces of the solution (or "system") and the interrelationships among the pieces of the solution. It is an approach to the design phase of system development that includes the following concepts and techniques:

- The idea that a system can be defined as a hierarchy of highly independent, single-functioned modules.
- A strategy (or group of strategies) to produce such a hierarchy by refining each function into its constituent subfunctions, according to a formal theory of "modular" systems behavior.
- A method of graphically representing a completed or in-process design as a "structured chart." The structure chart is both a form of documentation and a tool for aiding the design process.
- A measure (called cohesion) of exactly how "strong," or single-functioned, each module actually is.
- A measure (called coupling) of exactly how interdependent the modules actually are.
- A set of guidelines, or heuristics, that can be used to distinguish the best design among several alternatives.
- A strategy (called packaging) for partitioning the completed systems design into individually executable load units (or programs).

The objective of applying structured design is to decrease the complexity of a proposed system. While traditional "design" methods will produce a system that is far more complex than the problem the system intends to solve, the application of structured design will produce a system that is no more complex than the actual problem itself.

This reduction in complexity will subsequently result in significant cost reductions during implementation and in a system that is more reliable, easier to maintain and easier to modify than otherwise possible.

Formal Design Technique

The achievement of less complex, inexpensive systems is only possible through the use of formal design techniques, such as those found in structured design. There are a significant number of improved productivity techniques in use today, but none of them will achieve optimal results unless a complete formal design has been accomplished. These techniques are entirely independent of, and yet completely compatible with structured design.

It is a common misconception that structured programming is equivalent to structured design. this is, however, completely false.

In fact, structured programming, although highly desirable, will produce mediocre results if not used in conjunction with a formal design methodology like structured design.

Fish is an account representative with Keane Associates, Inc., Boston, Mass.

OPERATING LEASES

- 3, 4, 5 YEAR WALKAWAYS
  - NEW OR USED 370'S
  - MEMOREX PERIPHERALS
- MACHINE AVAILABILITY
  - 138/148/3033 ON ORDER POSITIONS
  - 135/145/155 PORTFOLIO

I C D CORPORATION

17 Sherwood Pl.
Greenwich, CT 06810
Dick St. Francis
(203) 661-2904

3301 Woman's Club Drive
Raleigh, N.C. 27612
Dean Painter
(919) 787-9085

700 E. Maple
Birmingham, MI 48011
Ed McKelvey
(313) 645-1462

2 Palo Alto Sq.
Palo Alto, CA 94304
Bruce Dunlap
(415) 490-1575

IBM PROCESSORS & PERIPHERALS

THE WORLD'S LARGEST IBM DEALER CAN GET YOU MORE FOR LESS.

BUY ● SELL ● LEASE

The Logical Choice
COMDISCO®
9701 W. Higgins Rd. Rosemont, Ill. 60018
(312) 698-3000

San Francisco 415/944-1111
Fort Worth 817/534-1774
Atlanta 404/256-5956
Minneapolis 612/854-8107
New York 201/568-9666

Short Search for Software Can Be Fruitful

(Continued from Page S/6)
installations there are, the more bug-free the system will generally be.
free the system will generally be.

- What modifications are necessary for installation? If there are any, they will cost you money. Find out how much.
- Is there a cost for evaluation? This should have been stated up front, but it never hurts to ask.

Once you have qualified both the company behind the product and the product itself (all of which can be done on the telephone), you are ready to institute other shortcuts that will get you to that successful software goal.

Shortcut number two is to use the vendor as a consultant. Chances are very good that after you have qualified the vendor down to this point, he can give you excellent ideas on how to use the product.

Ask for user references in your industry and with your specific machine type and operating system. You can rely on the experiences of others in this business.

The vendor can be used as a cost-free consultant during the process of software acquisition. He is a walking repository of information on cost-justifying his products, studies that show the benefits of his products, experiences of others both with and without this product, etc.

It is also common and fair to ask each vendor about his competition, not to downgrade another product, but to illustrate the superior or unique aspects of one product over another.

Shortcut number three is to use your associations. Employees of your organization probably belong to several DP organizations. It could save you a lot of time to poll the membership of those organizations by mail to ask of experiences with a specific software product. Several organizations regularly publish catalogs of such information for members.

In addition, it can be a very worthwhile experience to probe the experiences of fellow professionals at large user group meetings such as Guide, Share and Common. You can be assured that the opinions you gather there will be candid ones.

Shortcut number four is to poll your industry. Certainly you know the members of your industry are involved in DP. You may be on first-name terms with people at those other companies. It is a relatively easy matter to draft a letter and a one-page questionnaire to be sent en masse to all of those DP people.

Ask them their recommendations for a specific situation and why. The best answers will be obtained from people who are quoting from firsthand personal experience.

Shortcut number five is to poll your employees. Chances are, if you have more than five people in programming and management in your installation, some of the people are relatively new. Chances are, also, that they have had software experienced elsewhere in the DP industry.

It won't take long to ask your people if they have familiarity with any of the packages you are considering. By no means should their opinion be the last word on the system evaluation, but their input can certainly give you some direction as to the questions that should be asked across the board.

Shortcut number six is to pay a consultant/software broker for information. This isn't the most economical way to evaluate software, but it is less expensive than subsidizing your own evaluation research. The one true way for this shortcut to have a true net effect for the searcher, however, is to check more than one source or commission, more than one study. No matter how objective any one source might try to be, that source is limited in its knowledge and if there is one thing you don't need when evaluating software, it's half knowledge of a topic.

The key to success involving these shortcuts is reliability of your peers and the information they have been able to gather through firsthand knowledge of various software systems.

Landgraf is executive vice-president of Pansophic Systems, Inc.

Buy The HP Don't Get Caught And The

The rock? That's your shiny, new HP 3000/II computer. Full of promise. Ready to do great things. Probably a very wise buying decision on your part.

And the hard place? Well, that's another place altogether. The place you're at when you discover that, all of a sudden or somewhere just down the road, you have large disc needs and a high ticket system that can offer only small disc solutions.

Needless to say, the hard place is no place to be.

Microcomputer Systems Introduces The MSC-1677. A Disc System With Big Capacity, High Reliability and Super Savings.

Our MSC-1677 is a high-power, low-cost hardware combination that delivers all the mass disc storage you require to keep your HP 3000 working and profitable. Part I of this attractive subsystem is our own super-sophisticated MSC-1000 disc controller, a product of advanced microprocessor-based technology—and a product field proven to be the most reliable and maintainable in the business.

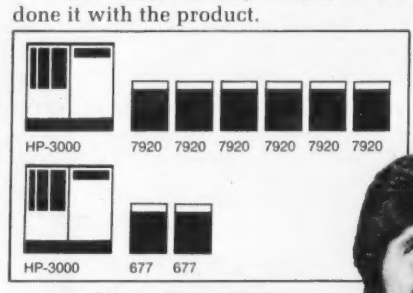
Part II is Memorex's impressive 677, a 200 megabyte disc drive that boasts a track record of over 15,000 successful installations. Together, these parts form a package that is totally hardware/software transparent under MPE—and totally superior to the disc package HP offers with the Series II.

Sometimes, Two Rocks Are Better Than One.

We know what you're thinking. Single-source systems, particularly Hewlett-Packard single-source systems, can make one feel very warm and cozy. But warm and cozy can turn uncomfortable and unprofitable in a hurry. Because it doesn't make a lot of sense to pay for the security if the system doesn't deliver the storage you need. Particularly when you can get both the security *and* the storage by working with us and *our* working partner, Memorex Corporation—like HP, a rock to be reckoned with.

Memorex, long known as the "memory/excellence" people in the IBM-compatible marketplace, has helped us make the HP 3000 a sensible, reliable, cost-effective alternative to IBM mainframes. Perhaps more than anyone else, Memorex has "written the book" on the successful installation of disc subsystem add-ons. They have, in large measure, shown the way in making "mixed vendor" systems preferable instead of just tolerable. They've done it with support—before, during and after the subsystem installation.

But most of all, Memorex has done it with the product.



Sometimes, Two Drives Are Better Than Six.

Particularly if they are Memorex 677 drives. This 200 megabyte, single spindle, disc storage drive is the product of three generations of Memorex disc experience. And it is the one product that has been installed more often than any other of its kind—count them, over 15,000 units at work for customers today.

No question. This is exceptional, feature-laden hardware. But what is more important to you is this: with 150 megabytes each of usable storage, *two 677's will do the work of six HP 7920 discs.* That can mean upwards of 50% cost savings on the initial drive purchase alone. It can also mean dramatic increases in the mean time between failure. Because, over and above the proven reliability of the 677, two electromechanical devices are simply going to break down a whole lot less than six.

Your HP 3000 Will Never Know How Much You Are Saving.

Thanks to Microcomputer Systems MSC-1000 disc controller, which emulates the presence of the biggest drive

With Unplanned Application

Importer of Frozen Seafood Nets Bonus Catch

SAN DIEGO, Calif. — Like finding the proverbial pearl in an oyster, Ocean Garden Products, Inc. here has netted an unexpected bonus by using its small business system for in an unplanned application.

The frozen seafood importer originally bought its system to handle routine accounting functions. The system has since been given the extra job of controlling sales traffic by determining which cases in a given warehouse should be removed to fill incoming orders and then issuing sales invoices as the goods are shipped.

Founded 20 years ago, the firm has been using computers for accounting for more than a decade, according to controller Frank Barrancotto. At one time an IBM System 360 was leased but "it was too big and too expensive. However, our sorting and computational needs are so high that nothing smaller would do," he said.

A switch to a service bureau followed, with Ocean Garden personnel punching cards that were sent to the bureau for handling. "This had drawbacks, too," Barrancotto said, "since it didn't give us an interactive capability, which is particularly important in terms of checking customer records or reviewing transactions. The service bureau was performing a simple historical function compiling data."

In mid-1972, Ocean Garden had a management consultant conduct a study to determine an economical, flexible accounting system. Initially, a Basic/Four Model 400 was recommended, and since then the company has upgraded to a Model 600.

The Model 600 is at the food company's headquarters to prepare data for the IBM 360 used at the local service bureau. This enables the accounting department to work with elementary data in its offices, yet have the 360 to process as much as 100,000 records at a time.

The present Model 600 system consists of one CPU, six CRTs, two 200 line/min printers, one paper tape punch, one magnetic tape and two disk drives.

About a year after installation of the original system, Barrancotto and his staff began toying with the notion of using the computer to handle sales traffic from the warehouses in which Ocean Garden stores its imported frozen products. The sales inventory control system went live in September 1976.

In discussing the order entry aspects of the system, Barrancotto explained that as orders are received, sales information is typed onto the video display terminal and entered into the customer files. While this data is being reviewed and adjusted, the system is also performing accounts receivable functions. The Basic/Four system maintains a perpetual physical inventory of what lots of products are in which warehouses, and a salesman decides from which warehouse to take the goods, but the computer selects the cases to take.

The decision is based on three criteria:

- The lot storage dates and when the space rental for various cases will lapse.
- The age of the products, based on when they entered the U.S.
- The size of the lot being ordered in relation to the tariff structure of the specific warehouse.

In what Barrancotto describes as an unusual process, the minicomputer punches out tape to drive a remote printer that advises the warehouse on which lots to pull and where to send them. This same information is also used by the mini to produce written confirmation records for the broker or the firm's own sales office, the trucker who will transport the shipment, the warehouse from which it's released and the final destination.

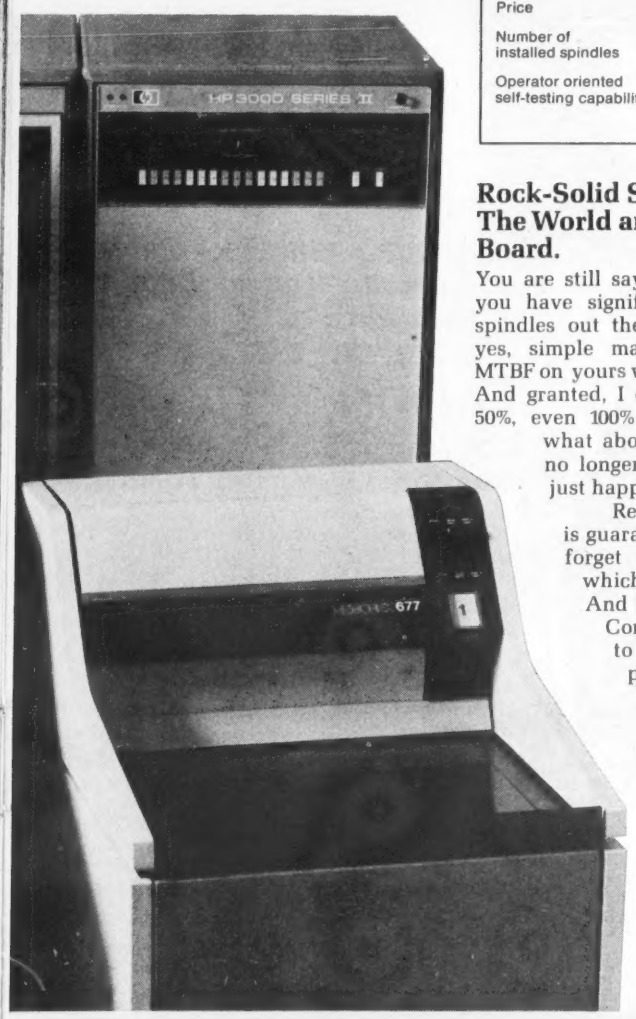
"Our sales inventory system plus the computer's ability to weight 40 to 50 lots in seconds contributes to the most efficient use of our inventories," Barrancotto concluded.

3000 But... Between The Rock Hard Place.

HP can offer, the 50-megabyte 7920—without emulating either its capacity or its overall cost. To the Series II, our 677 will look exactly like *three* 7920's. This means usable capacity of 150 megabytes per spindle, with up to eight spindles (or 1200 megabytes) supportable by one of our MSC-1000 wonders. It also means that *no* customized, non-HP software is required to do the trick. You'll never have to worry about staying up to date with future HP software enhancements to the 3000.

Disc Subsystem Comparison Chart

Feature	HP 7920	MSC-1677
Software Transparent under MPE/DS-3000	Yes	Yes
Microprogrammed Controller Architecture	Yes	Yes
Full ECC (error correction)	Yes	Yes
3330 Disc Technology	Yes	Yes
Capacity per spindle (megabytes)	50	150
Reliability	Good	Much Better
Complete Maintenance Support	Yes	Yes
Price	Competitive	Super Competitive
Number of installed spindles	Less Than 1000	Over 15,000
Operator oriented self-testing capability	No	Yes



Rock-Solid Support. Around The World and Across The Board.

You are still saying to yourself: "Sure, you have significantly more installed spindles out there than they do. And yes, simple math tells me that the MTBF on yours will be a third of theirs. And granted, I could save upwards of 50%, even 100% on drives alone. But what about once it is mine and no longer yours and something just happens to . . ."

Relax. Customer support is guaranteed. In spades. Don't forget one of the rocks on which we have built this ad. And this product. Memorex Corporation is committed to support the MSC-1677 program with its vast service organization—a sophisticated interweave of skilled people, strong technical support and a logistics network bound together for a single purpose: *immediate customer response.*

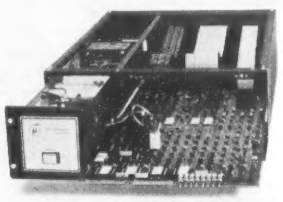
Beyond them, there is us. And our team of HP 3000 experts, backed by a fully functioning HP 3000/II System that can "acceptance test" subsystems, "systems test" spare parts, reproduce failures or anomolies so as to quickly analyze and troubleshoot problems at the system level.

Once again now, Memorex and Who?

Memorex and Microcomputer Systems Corporation. The people who forked out over three grand for this ad space because we think the MSC-1677 Disc Subsystem is something data processing decision-makers should know about. (We'd also like to sell a couple.)

In the coming months, you'll be hearing more from us. And not just in the HP 3000 peripheral add-on marketplace either. Dedicated to the continued "conception through production" development, generation by generation, of micro-programmed controllers a year or two ahead of the industry, we are already hard at work in the 317 mb and 630 mb Winchester technology arena.

Beyond our individually marketed controllers, we will continue to work with "rocks" like Memorex Corporation developing products like the MSC-1677. After all, wasn't it a rock that helped David take the steam out of a fellow named Goliath?

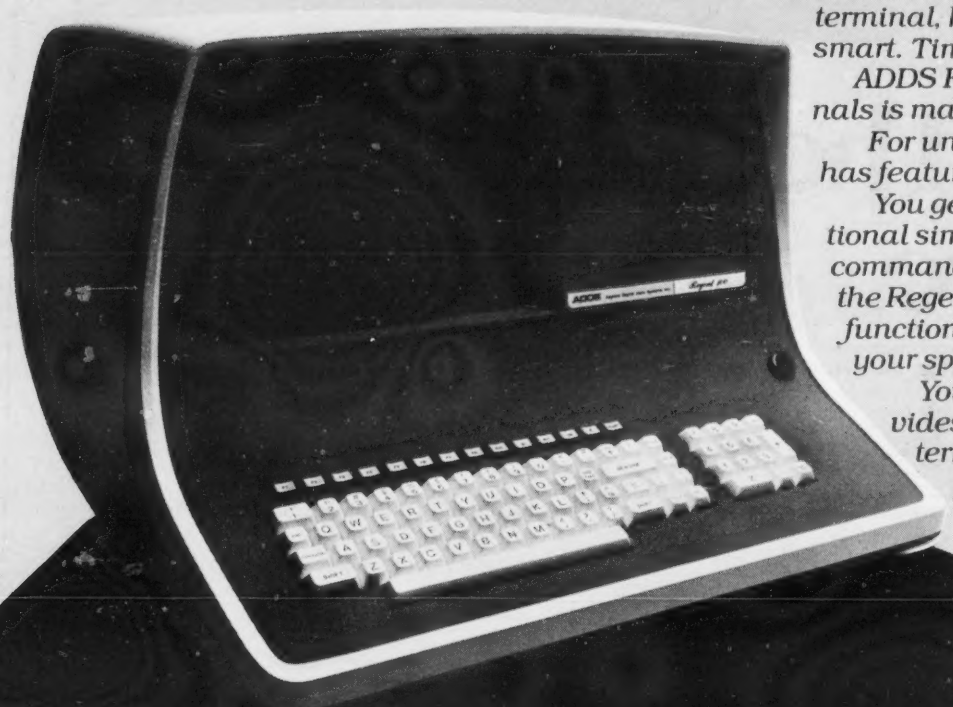


Call our President, James Toreson, at (408) 733-4200, to find out more. Or write Microcomputer Systems Corp., 440 Oakmead Parkway, Sunnyvale, CA 94086.

microcomputer systems corporation

Get Smart.

ADDS Regent · Smart for the price of Dumb.



Time was, if a man bought a Dumb terminal, he was considered pretty smart. Times change.

ADDS Regent family of Smart terminals is making Dumb look dumb.

For under $1000 our Regent 100 has features no smart man can resist.*

You get cursor controls for operational simplicity and extensive remote commands that make it easy to control the Regent from the computer. Optional function keys customize Regent to your specific application.

You get a Status Line that provides current information on the terminal's operating status. And, you get visual highlights such as blinking, zero intensity, half intensity, underline and reverse video.

You also get self diagnostics.

In other words, you get Smart. Or Smarter: Our Regent 200 has everything our 100 has plus buffered transmission, auxiliary port and editing options.

You can't get a whole lot more.

Get Smart. Get ADDS.

Quality, Reliability and Integrity. It all adds up to ADDS.

*In moderate quantity.

ADDS *Applied Digital Data Systems Inc.*
100 Marcus Blvd., Hauppauge, New York 11787 516-231-5400

Name _____

Firm _____

Title _____

Address _____

City _____ *State* _____

Phone _____

Mini Bits

Commercial Applications Set as Five-City Course

NEW YORK — "The Commercial Application of Minicomputers" will be the topic of a course given by the American Management Associations in five cities this fall and winter.

The course will be held in Chicago, Sept. 26-28; New York, Oct. 26-28; Los Angeles, Nov. 7-9; Atlanta, Dec. 12-14; and San Francisco, Feb. 8-10.

The course costs $425 for members of the organization and $490 for nonmembers. Teams from the same company can be accommodated at a reduced rate.

The organization is located at 135 W. 50th St., New York, N.Y. 10020.

DG Sets Seminars

WESTBORO, Mass. — A series of seminars discussing the minicomputer as a management tool will be presented in several cities this fall by minicomputer vendor Data General Corp.

The seminars will address the ways minis can help businesspeople deal with inflation, competition and government regulation, according to a spokesman. Included in the three-day meeting will be a demonstration of the firm's small business system.

Seminars will be held in New York, Sept. 27-29; Philadelphia, Oct. 4-6; Chicago, October 11-13; Atlanta, Oct. 18-20; Dallas, Nov. 1-3; Los Angeles, Nov. 15-17; and San Francisco, Nov. 29-Dec. 1. Additional information is available from DG, Route 9, Westboro, Mass. 01772.

Common to Meet in Boston

BOSTON — Common, an IBM users group, wil. hold its fall conference Oct. 9-12 here.

Common members who use IBM 3, 7, 32, 1130, 1800 and 5100 systems as well as DOS/VS and OS/VS are urged to attend the conference, which will feature over 50 sessions consisting of users and IBM speakers addressing various DP topics, a spokesman said.

Several sessions will be devoted to the System/34 and Series 1. A luncheon presentation by Robert A. Yellowless, director of worldwide requirements for the General Systems Division, will give General System's perspective on the future of DP.

Information on the meeting is available from David G. Lister, Administrative Director, Common, Suite 1717, 435 N. Michigan Ave., Chicago, Ill. 60611.

Storage to 128K

IBM Enhances System/34

By Esther Surden
Of the CW Staff

ATLANTA — IBM's General Systems Division has announced several enhancements to its System/34 small business system, originally announced in April. The enhancements were designed to provide additional storage — up to 128K bytes — and allow the attachment of up to 64 remote workstations via ordinary telephone lines.

The enhancements are said to solve some of the major user-oriented weaknesses in the system that have been pointed out by industry observers.

IBM also added application programs for manufacturing and distribution as well as another version of its 5251 CRT workstation, the Model 12.

The Model 12 stations, which must be used to take advantage of the System/34's communications options, allows users to link remotely located workstations with a central data base and use common application programs, IBM said.

With the additional storage capacity, users can now opt for either 96K bytes or 128K bytes of storage. The previously announced top capacity for the system was 64K bytes.

Also added to the system was a second communications line. This second line can "balance traffic on the communications line or provide concurrent data processing from remote workstations while communicating with other systems," IBM said.

The workstation can be attached to either or both of the communications lines. It features a 1,920-character screen, keyboard, field highlighting and data editing and serves as the communications controller for additional workstations at the remote location.

Up to eight workstations, which can either be IBM 5251 CRT stations or 5256 tabletop printers, can be attached to each remote Model 12. The System/34 can address up to 64 workstations attached via communications lines and up to eight attached directly.

The Model 12 provides communications control functions and can be located wherever common carrier facilities can be installed, IBM noted. Communications with the System/34 is via Synchronous Data Link Control protocol.

The clustered 5251 display stations or 5256 printers can be located up to 5,000 feet from the display station serving as controller, a spokesman added.

Prices for a System/34 range from $32,700 for 96K bytes to $47,220 for a 128K-byte system. Monthly rental ranges from $962 to $1,413 and monthly lease prices from $875 to $1,285.

First deliveries will be in September of next year, IBM said.

The second communications line adapter, scheduled to be available in January 1979, will cost $2,880, $88/mo to rent or $80/mo to lease.

The 5251 Model 12 CRT station with keyboard feature and electronic interface adapter also will be available in January 1979 for a purchase price of $4,830, monthly rental of $165 and monthly lease of $140.

One of First System 700 Users Pleased by 'Big-Time Features'

By Esther Surden
CW Staff

LOS ANGELES — One of the first users of the Basic/Four Corp. System 700 said he is pleased with the system's ability to provide his company with increased capacity and "big-time computer features."

According to Charles Smith, vice-president for DP at American Insurance Consultants, Inc. here, the Basic/Four system is a sophisticated one that fits his firm's needs. A former Model 600 user, Smith recalled that "we could have increased our capacity on the 600, but we would have reached the limit in another six months."

The firm was founded in 1969 and performed all applications manually until 1972, when it went to a service bureau. The 600 was installed early in Dec. 1975.

The System 700, announced about a year ago [CW, Oct. 4], was delivered at the end of April to the user, an administrator of group health and accident insurance. The system performs monthly billing and cash receipt applications; it also reports to carriers on moneys collected and aids in claims processing and check writing.

Present hardware at American includes the CPU with 72K of memory, five CRTs, four 75M-byte disks with 150M Bytes on-line and a 1,300 line/min printer.

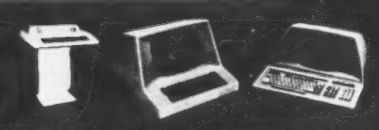
Smith said conversion from the 600 to the 700 has been "simple," although "it does take time." First programs are converted at Basic/Four's office. "You can hook the 600 to the 700 to convert files directly," he explained.

The 700 was attractive to American because "you can control videos off of the central unit, designate who you want to use the videos and hook more of them into it."

HEY, BERT! WHO'S GOT THE BEST PRICES AND FASTEST DELIVERY ON DEC & LSI TERMINALS?
OH BOY! WE HAVE, DUMMY. WERE MTI... OF COURSE, OF COURSE... AND WE HAVE EVERY TERMINAL ON SALE, LEASE OR RENTAL.

Just Look at These Terminals!

DEC writers – LA36/LA35
DEC writer III – LS120
DECprinters – LA180
Lear Siegler ADM1
Lear Siegler ADM2
Lear Siegler ADM3
DEC Scopes VT50
DEC Scopes VT52
DIABLO Hyterm



. . . and OMNITECH Modems, MFE Cassette Data Terminals, and everything else you need for your Communications Network.

For a quick response Call TOLL FREE 800–645-8016

In New York Call 516–482-3500 or 212–895-7177 Ask for Bert or Lenny

When you buy from MTI you get a Price Advantage and a lifetime friend you can count on!

mti

159 Northern Boulevard, Great Neck, New York 11021

Using Effectiveness Grid — Part 2

Method Promotes Organizational Enrichment

By Carl Masi
Special to CW

One of the most important future issues in any organization is one that has been virtually impossible for users to implement in the past three decades because of the limitations of the technologies used. That issue is known as organizational enrichment. This is a "quality of life" matter that is becoming increasingly more important.

Surely the day of the keypunch person pounding only little rectangles in little cards eight hours a day is finished. Today's products make it much easier to give that person more satisfaction, more dispersed responsibility. People need responsibility to excel and more authority, at least commensurate with expanded responsibility.

Equal in subtlety, as well as importance, is the fifth major issue — policy impact. And it may be a polite term that expresses what has to be the biggest worry of distributed systems planners: "Are we opening a Pandora's box of loss of control of our total operation?"

This is the second part of a two-part series on using an effectiveness grid to determine distributed processing methods.

Who decides what equipment will be selected initially, with what capabilities and for what applications? That in itself is difficult to decide. Just think how much more difficult it will be a year or two from now when time and need will have altered the priorities of each local site.

Another issue is cost allocation. Who pays for what increment of hardware? Will it be that far-off branch office, its parent department or the DP group?

What costs will be allocated, to whom, under what criteria. These, we all know, are extremely complex issues.

Another policy matter is vendor/user relationships, and this issue escalates in complexity in direct relationship to the utilization of equipment by multiple sites. Matters of concern here include: Who do we call to fix a software bug — the home office or the local software expert? Who do we call when we want to add more memory?

Another area of concern is the degree of local user authority a corporation is willing to give to operating field management, and still another is displacement policy.

For example, a distributed site has been in for a year. The office at which it is located has grown rapidly. It needs more processing to go along with the central site services it receives. Who makes that decision? In what time frame? Under what selection criteria?

And what about single vs. multiple vendor policies? Should there be one or many policies? Under what circumstances?

The final issue is productivity measurement. Distributed processing only makes sense if it allows an organization to function more effectively in one or more ways. But in terms of measuring sought-after benefits it is important to assess the related and sometimes overlooked matters of initial hardware costs, plans for full utilization of the new asset, benefits of displacing existing services, effects of new skill requirements on salary levels, cost implications of total new systems development and the cost/-resource requirement for maintaining the new system.

This article was excerpted from a speech delivered by Masi, director of product marketing for Wang Laboratories, Inc., Lowell, Mass., at a recent conference.

Computer Optics announces a new 3270 feature.

Immediate Delivery

Computer Optics can deliver a complete 3270 replacement installation — CRT displays, remote and local controllers, printers. And we can deliver tomorrow, the next day or as soon as you need it.

Computer Optics is totally dedicated to 3270 series replacement systems.

Minicluster systems that handle up to eight tubes or printers in a remote location. Maxiclusters, either local or remote, for up to 32 tubes or printers on one controller. All are plug-to-plug compatible with IBM equipment.

We've always saved you money over your IBM 3270 costs. And now, we can also save you time.

If you can't wait a year to expand your present display installations, or if you'd simply like to reduce your display costs, call Computer Optics immediately.

After all, time is money.

Computer Optics Inc.
Berkshire Industrial Park, Bethel, CT 06801

Toll free: 800/243-1314 In Connecticut call 1-744-6720 collect.

Mapping Mini Helps Assessors In Switzerland

KANTON AARAU, Switzerland — A minicomputer-based mapping system will soon be helping tax assessors here better determine the value of land and buildings.

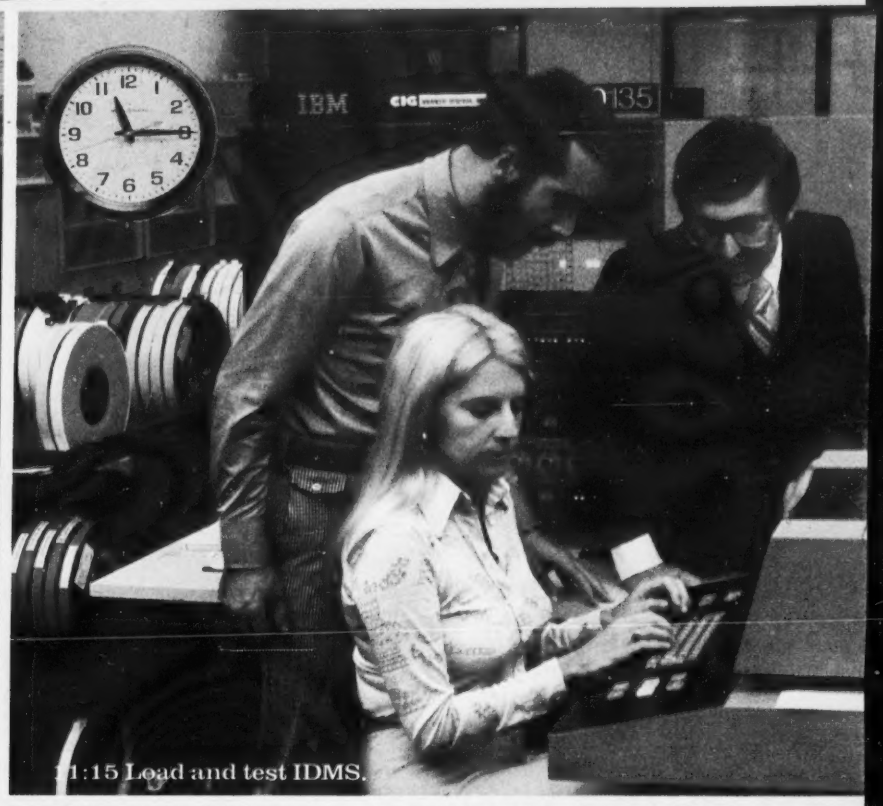
The system is being used in what is called a "municipal cadastral application." A cadaster is the total information known about a piece of property — usually expressed in the U.S. in the form of a title insurance policy, a spokesman explained.

Until recently in Kanton Aarau, title records and tax information were maintained by hand ledgers. Consequently, there was a backlog for updating the records — often years.

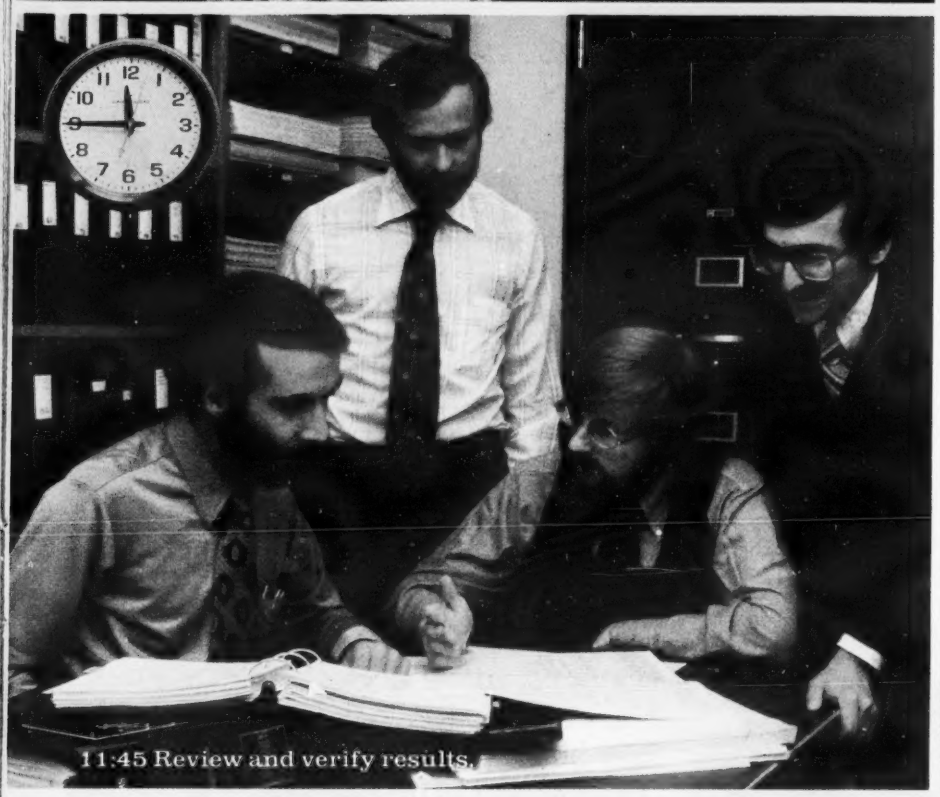
To cope with this problem, Aarau purchased a Calmagraphic interactive data management system, which is being used to "digitize" (convert to computer code) each individual parcel of land in the city, its zoning, its use and its ownership — in some cases going back as far as four or five centuries.

"This program started in June 1976 and will continue through May 1977," the spokesman said. The digitized information is then stored on magnetic tape where it can be recalled and presented on the Calma system's CRT or in hard-copy map on its high-speed plotter.

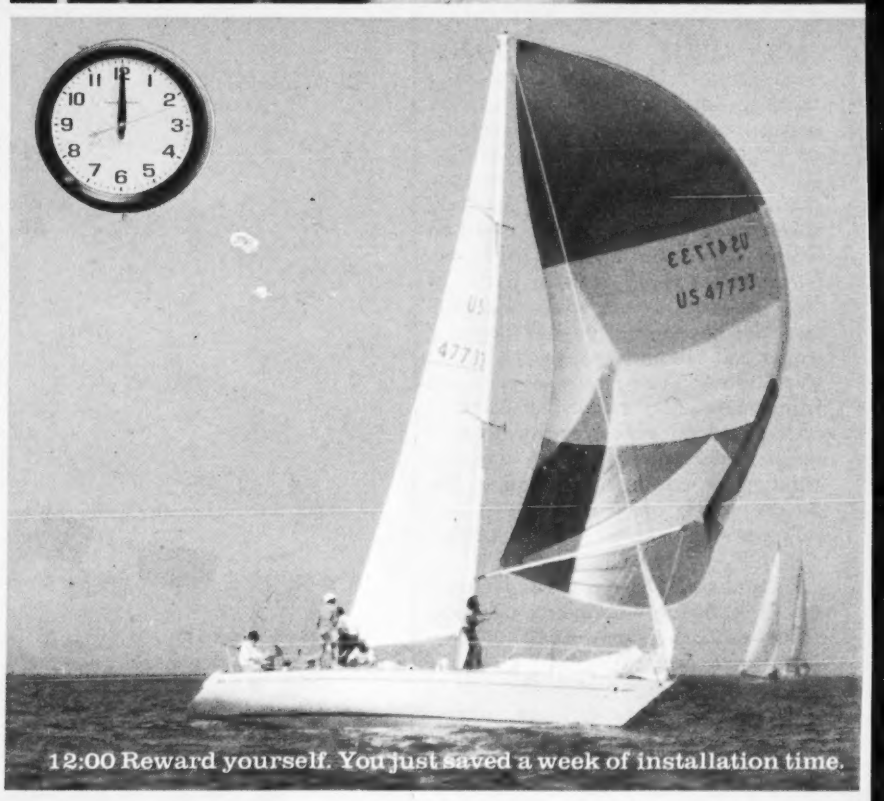
11:00 Q&A session to learn computer set up.



11:15 Load and test IDMS.



11:45 Review and verify results.



12:00 Reward yourself. You just saved a week of installation time.

"IDMS is the easiest DBMS to install"*

*say users in Datapro study

In the fourth annual Datapro Research survey of software users, Cullinane's IDMS was rated #1 among all Database Management Systems. #1 in Overall Satisfaction. #1 in Documentation. #1 in Training. #1 in Vendor Support. #1 in Ease of Use. And #1 in Ease of Installation.

We were rated "easiest to install" because IDMS goes in in one or two hours – not one or two weeks like IMS or DL/1. This is possible because we've worked hard to develop a simple installation process. Yet it's thorough – every system module is proved operational on your computer system.

Following installation, you also get a three-day training session in IDMS for as many of your people as you want. This training program was rated #1 in the Datapro study. For the complete story – including technical literature on IDMS and a schedule of seminars for your area – send this coupon, or phone us at (617) 237-6600.

Think twice. You'll choose the database system users rate #1.

1976 datapro HONOR ROLL

Name/title _____

_____

Organization/department _____

_____

City _____ State _____ Zip _____

Tel. _____ My computer is _____

Cullinane Corporation

Cullinane Corporation

Wellesley Office Park, 20 William St., Wellesley, Mass. 02181 (617) 237-6600

Mini-Based Units Read Pages, Documents

SIMSBURY, Conn. — Scan-Optics, Inc. has two mini-based optical character recognition (OCR) systems designed for small business users or large companies in which data entry requirements are distributed among many locations.

The System 506 and System 515 operate off-line and read both pages and documents. They can be operated "by regular office personnel with a minimum of training;" the company claimed.

Each system includes a CPU, optical scanner, floppy disks and graphics CRT and keyboard terminal for key entry or video image capture.

The 506, which can process up to 30 documents per minute or three pages per minute, costs $52,490 in its basic configuration. The 516 can process up to 60 documents or 7.5 pages a minute, the firm said. It costs $72,650 in its basic configuration.

One-, two- and three-year rental plans are available. The 506 rents for $1,587 monthly on a three-year lease, and the 516 costs $2,177 per month on the lease plan. The company is located at 22 Prestige Park, E. Hartford, Conn. 06108.

Controllers Fit DG Minis

BEDFORD, Mass. — Aviv Corp.'s TFC 701 and TFC 702 imbedded magnetic tape controllers can now be used with Data General Corp. minicomputers.

The controllers are transparent to the DG operating system, the firm said, and are inserted in the DG chassis.

The TFC 701 provides NRZI recording for standard tape drives with speeds of from 12.5 in./sec to 125 in./sec. It costs $2,500. The TFC 702 gives users both NRZI and/or phase-encoded recording techniques over the same speed range and costs $3,300.

The controllers are provided with documentation, diagnostic software, installation instructions and cabling, Aviv said from 300 Sweetwater Ave., Bedford, Mass. 01730.

Graphics Card For HP Minis

CUPERTINO, Calif. — The Intermedia Systems Model 4422 Graphic Video Generator I/O card for Hewlett-Packard 2100/MX and E Series systems is contained on a single circuit card.

Using the unit, the display data is stored in a local screen refresh memory. The random-access memory allows plotting in excess of 300,000 point/sec, the company claimed.

Software includes a Fortran-callable graphics library, drivers for all HP operating systems and a device diagnostic, the firm added.

The unit costs "less than $2,000," a spokesman claimed from 10601 S. Saratoga-Sunnyvale Road, Cupertino, Calif. 95014.

Turnkey Aimed At Novice Users

MILWAUKEE, Wis. — The Mesa Two from A.O. Smith Corp. is a turnkey small business system that comes with a library of accounting programs designed for first-time users.

The system, which the vendor says carries the name of a product formerly sold by Martin Wolfe, Inc., is based on Data General Corp. hardware. Software provided includes packages for accounts receivable, accounts payable, inventory, payroll, general ledger and sales analysis, according to a spokesman. Audit trails are provided from financial statements, he added.

The system can communicate to a larger mainframe if needed in a distributed processing appplication, the vendor noted.

The minimum hardware includes a 64K CPU, a 165 char./sec printer, a CRT and 10M bytes of disk. The system costs $57,000 including software. Prices range upward to $100,000 depending on options selected.

A.O. Smith noted that the system will be ready for delivery in five months. Its Data Systems Division can be reached through P.O. Box 584, Milwaukee, Wis. 53201.

900 Line/Min Printer Suits Range of Minis

FORT LAUDERDALE, Fla. — A 900 line/min impact printer that interfaces to Data General Corp., Digital Computer Controls, Digital Equipment Corp., Interdata, Hewlett-Packard and Lockheed Corp. minicomputers is available from Southern Systems, Inc.

The unit accommodates up to six-part forms. It costs $15,440 including control logic, buffering, interface and cables from the company at Suite 309, 3000 N.E. 30th Place, Ft. Lauderdale, Fla. 33308.

INTERDATA?

INSTALLATION AND CONSULTING

If it's the beginning - START OUT RIGHT! We supply the expertise and training to get you going with OS32MT and 16MT2. The best job for the best price.

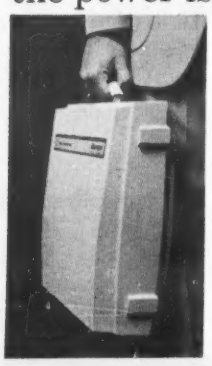
THE CONSULTING CORPS
P.O. Box 11927
Lexington, KY 40579
606/255-0586

TI's new portable means remote

Until now, remote order entry meant expensive on-line operation with a computer via a telephone line.

But TI has changed all that.

The new *Silent 700** Model 765 Portable Memory Terminal has built-in bubble memory. So it can remember, even when the power is off, while it waits to talk to your computer.



With the 765 you can enter sales and order information all day long using the typewriter-like keyboard.

Then you can edit when you have time.

The 765's powerful, yet easy-to-use text-editing functions let you add, delete, locate, and correct data on the spot. So you can transmit more accurate data when the phone rates are lower. At a fast 30 characters per second.

Traveling companion.

Lightweight portability is the key to convenient field use. And at 17 pounds, the 765 is really compact.

But it's no lightweight when it comes to features. With its built-in numeric cluster, keyboard with upper and lower case characters, quiet 30-cps printer, and acoustic coupler for telephone connection, the 765 is a heavy-duty operator.

And the 765 gives you plenty of storage space. The basic terminal comes with 20K bytes of memory. And it can be expanded to 80K bytes—the equivalent of up to 20 fully typed pages.

System Helps Firm Triple Cash Flow Speed

VENTURA, Calif. — A small business system at Bruce's Transport Service here has tripled the speed of cash flow for this company and will pay for itself in three years, according to William Aulich, accountant for the firm.

The company's primary business is hauling oil well drilling tools and equipment. As such, it is regulated by the Public Utilities Commission (PUC) as well as the Interstate Commerce Commission. The reports these agencies require are extensive, and in addition to keeping track of all general accounting details, the firm must keep tabs on miles driven, weight carried and surcharges for each driver and each vehicle.

A small business system was clearly needed to provide this information. The company first installed an NCR Corp. 399 system which, according to Aulich, "never worked. We were very unhappy with the performance of both the hardware and software."

After eight months, the firm began surveying the field for another system that could do the job. It looked at IBM, Singer Business Machines, Burroughs Corp. and Digital Equipment Corp. systems and finally purchased a DEC Datasystem 310 in October 1976, Aulich reported.

The system was programmed by Mini Computer Business Applications of Los Angeles. The first set of programs were test run on the software vendor's mini, so "we were up and running as soon as we got the hardware in. The rest of the programs followed soon after."

The system will pay for itself in three years, Aulich predicted, through reduction in personnel needed, cut overhead and faster turnaround time on invoices. Staff has already been cut in half.

"We're turning our records around daily now, instead of always being five, six or seven days in arrears as we were when the accounts were being done by hand. Invoices which used to go out every three or four days are now going out daily.

"And since we're getting money back three times as fast, we're tripling the speed of cash flow," Aulich said. Payroll now takes three hours as compared with three days and accounts payable has been reduced to three hours from five days, he added.

Its versatility, dependability and cost sold the company on the system and it's a decision the firm feels was well made. In fact, the PUC has asked other firms of this type to come look at the system at Bruce's, Aulich said.

Mini Answers User's Demand For Job Control

REGO PARK, N.Y. — Sometimes the best system for the job isn't one touted by a major computer manufacturer; sometimes it's a system from a turnkey vendor that suits the particular needs of a user in a specific industry.

That's the opinion of John Bianco, head of accounting for Samson Management Co., a real estate management firm.

"Most systems you look at are designed to suit a multitude of purposes and to attack the biggest market," he noted. But the system his firm purchased was designed by people who knew real estate management.

The system has "produced almost everything we expected of it, with faster turnaround and much better control of our overall picture than before," Bianco said.

Switch From Bureaus

Samson switched from service bureaus that handled the firm's work over the years. Small business people should remember that "it's a lot more work" to own your own system. "You now have to contend with doing the work that the service bureau formerly performed." However, if you are willing to do this, an in-house system can be a "great improvement," he advised.

The equipment installed at Samson includes a VMAC II mini from Columbus Computing, based on a Data General Corp. Nova CPU with two disk drives, a Centronics Data Computer Corp. printer and three Hazeltine CRT terminals.

With the system, management can secure information on demand that previously was not available at all or very difficult to produce, Bianco noted. While service bureaus might have been adequate indefinitely, the company initially decided it needed this system to gain control over the general ledger which was maintained by a hybrid of service bureau computer and in-house manual methods, making it very difficult to analyze.

Development Effort

Thus, when the system was installed, the primary development effort was given to the general ledger, producing information available in response to inquiry.

"Real estate management is typically in the hands of family-run enterprises such as ours, with principals the dynamic sort who want what they want when they want it," Bianco said.

"When a pricipal asks for a June 30 rent roll on June 15, he may be only half-kidding. With a system in-house, you're not tied to the batch processing schedule of the service bureau. You go to your own terminals and printer and can usually generate what you need right away.

memory terminal order entry.

Office companion.
Many people want a terminal with the features of the 765 for applications where portability is not required. So we designed the Model 763. A table-top version of the 765, the 763 has the same performance capabilities in a compact unit, and comes standard with either a TTY current loop or EIA interface instead of the acoustic coupler.

Small price for remembering.
TI's new Model 765 Portable Memory Terminal is priced at only $2,995.† Additional 20K increments of bubble memory are $500† each.

And, the table-top Model 763 at $2,695† is another price/performance leader. Of course, quantity discounts and a complete range of lease programs are available.

TI terminals mean business.
Ask TI how the new *Silent 700* Memory Terminals can help your business. Return this coupon today for more information. Or call Terminal Equipment Marketing at (713) 494-5115, extension 3286.

TEXAS INSTRUMENTS
INCORPORATED

Yes! I am interested in the 765/763. SILENT 700 electronic data terminals
☐ Please have your representative call.
☐ Please send me more information. ☐ 765 ☐ 763
Name _____
Title _____
Company _____
Phone _____
Address _____
City _____ State _____ Zip _____
Mail to: Texas Instruments Incorporated, P.O. Box 1444, M/S 784, Houston, Texas 77001 13-9-CW

*Trademark of Texas Instruments
†Qty. 1, U.S. Domestic Price
Copyright © 1977, Texas Instruments Incorporated

TEXAS INSTRUMENTS.

Minis Built for Governments

SPRINGFIELD, Ohio — Computer Systems and Services, Inc. recently introduced its System 88 series of minicomputers, designed for use in local government, manufacturing and distributing applications.

Three hardware packages are available for the unit, which is based on an Interdata 7/32 CPU. The Series 1 with 128K bytes of main memory, 20M characters of disk in two drives, two CRT terminals and a heavy-duty 300 line/-min printer costs $58,900.

The Series 2 with 192K bytes of memory, 134M bytes of disk storage on two drives, two 9-track tape drives, four CRTs and a 600 line/min printer costs $110,000.

The third member of the family, the Series 3, has 256K bytes of memory, 512M bytes of disk, two industry-compatible 800-and 1,600 bit/in. tape drives, eight CRTs and a 1,000 line/min printer. It costs $192,600.

Available software includes packages for tax accounting and billing, treasurer's on-line receipt posting, collection and receipt reporting.

The firm assumes "single-source responsibility for hardware, software, user training, technical support and hardware maintenance," it said.

The system can be expanded from the smallest model to the largest without replacing the CPU, the company noted from Suite 403, 120 S. Linestone St., Springfield, Ohio 45502.

Ampex Has PDP Options

EL SEGUNDO, Calif. — Ampex Corp. has expanded its line of plug-compatible core memory systems for the Digital Equipment Corp. PDP-11/70 minicomputer with two additional models.

The ARM-1170 Model B is said to provide 64K to 128K words of memory in 5.25 in. of rack space, including power supplies and blowers. The unit enhances performance through two-way memory interleaving on systems equipped with 128K words or less of DEC memory, Ampex said.

The ARM-1170 Model C includes up to 256K words of memory in 10.5 in. of rack space, also including power supplies and blowers. It uses two- and four-way memory interleaving techniques to enhance performance, the vendor noted.

The systems are "totally transparent" replacements for the MJ11 and MK11 memories used in the PDP-11, he stated.

The Model B costs $12,875 for 128K words and the Model C costs $23,865 for 256K words. Ampex is at 200 N. Nash St., El Segundo, Calif. 90245.

HP Turnkeys Automate Labs

PALO ALTO, Calif. — Hewlett-Packard Co. has three mini-based turnkey laboratory automation systems using chromatographic software.

Designed for analytical research, quality control and process monitoring applications, the 3351B, 3352D and 3353A systems are incrementally expandable, HP explained.

The 3351B and 3352D include an HP 21MX processor with 16K words of memory, an A/D converter and a 30 char./sec printer and console with built-in dual cassettes.

The 3353A has a thermal line printer, CRT terminal with 12K bytes of memory and a dual tape cartridge.

The systems range in price from $10,000 to $24,800 HP said from 5207 Page Mill Road, Palo Alto, Calif. 94304.

MDB Controller Links HP 21MX, Printers

ORANGE, Calif. — MDB Systems, Inc. has a plug-in line printer controller for the Hewlett-Packard Co. 21MX.

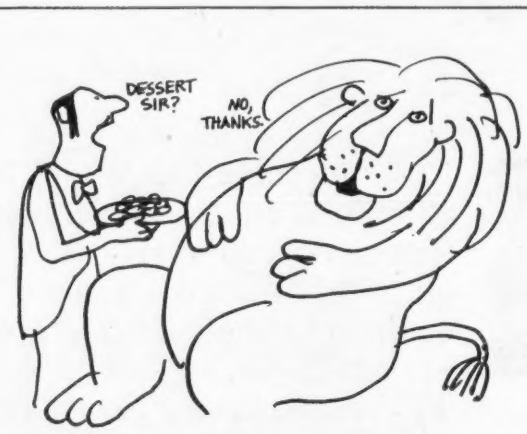
The controller is said to be transparent to host computer diagnostics, drivers and operating systems. It is contained on a single circuit board.

The controller costs $850 to $1,250 depending on the printer used. It will operate with any printer that has a Centronics Data Computer Corp. or Data Products Corp. buffer emulator, a spokesman noted from the company at 1995 N. Batavia St., Orange, Calif. 92665.

Everybody Wins!

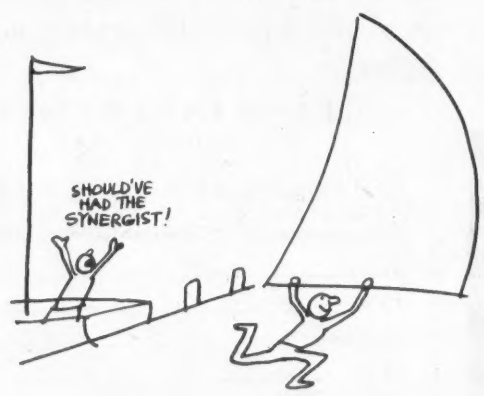
with The SYNERGIST™ Business Systems

Become a Synergist Dealer. Everybody Wins! With the right system at an affordable price. Whether it's a one user standalone, a 4 to 8 user midi, or a 32 user giant, DCC has it. The Synergist. A comprehensive family of integrated business computer systems.



A Full Line of mainframes, disc drives, terminals, printers, and workstations—tested to work together. With operating systems, Business Application Libraries, text retrieval systems that scale up without expensive reprogramming. And with plain English requests for on-the-spot management information.

Sell with Confidence. Backed by Data General, one of the largest computer companies. With over 40,000 computers already installed. With software support, dealer training programs and nationwide repair service.



Don't Ever Lose a Sale Again because your customer needed something larger, smaller, or more flexible. Join the select group of the best managed, business system dealers in the industry. Sell The Synergist. Write or call Ronald S. Harvey, Business Systems Sales Manager, (201) 575-9100.

DIGITAL COMPUTER CONTROLS INC

A Subsidiary of Data General Corporation
12 Industrial Road, Fairfield, New Jersey 07006
Phone: (201) 575-9100/TWX 710 734 4310

PDP-11, Nova, and Eclipse Users

Call (617) 272-8140 or write TODAY to find out about the best price/performance packages available for disk and communications.

- ☐ **DEC RK-11 Replacement. . . .save 40%!**
- ☐ **DG 4046 Replacement. . . .save 40%!**
- ☐ **DG 4234 Replacement. . . .under $3000!**
- ☐ **CDC Storage Module Controllers for PDP-11 and Nova . . . . .save over 50%!**
- ☐ **LSI-11 moving head disk controller**

With features designed for the systems user, at prices structured to fit your budget.

Xylogics

42 Third Avenue
Burlington, Mass. 01803
Tel (617) 272-8140
TWX (710) 332-0262

With Micro Interfaces

Builder Shares Knowledge, Frustrations

By Doug Anderson
Special to CW

I own an Altair 8800 with 21K bytes of static random-access memory (RAM), a Processor Technology Corp. video monitor board, a Panasonic video monitor and two Shugart Associates mini-floppy disk drives with a North Star Computers, Inc. controller. In addition, I have a Practical Automation printer, a surplus Texas Instruments keyboard and modem, a Mits, Inc. EIA board for the modem and four-port parallel I/O board for the keyboard and printer plus a Cromemco 8K-byte programmable read-only memory (Prom) board with 5K bytes of Prom.

My Altair was ordered back in March 1975 and delivery took about three months. This was my first electronic kit and I did a number of things wrong. After about six months, however, with a lot of help, I got it to run simple programs that were toggled in on the front panel switches.

Things Learned

During the building of the kit, I learned a number of things the hard way: to wipe a soldering iron instead of filing it; that chips must be in sockets to facilitate replacement; that Molex, Inc. Soldercons were essentially useless for my purpose; that about 10% of all chips will eventually fail; and that dynamic memories cause far more problems than static memories.

I spent a very frustrating six months trying to get a Mini Micro Mart cassette interface to work — and failed. I ordered a different interface from Morrow's Micro-Stuff, put it together and it worked right away. That made life a lot simpler, since I am a software guy by nature and the operational cassette opened up new worlds. I could write and compile software. Since I initially didn't have a hard-copy capability, I would call up a terminal with an auto-answer modem and print there.

The cassette eventually proved a frustration, though, as the bit dropout rate was too high. I finally ordered a mini floppy and controller and sold the cassette board. The result was no more dropouts, and I was able to increase my productivity ten fold. I ordered a second drive and have plugged that one in, too.

I ordered a printer from the Digital Group and it proved to be a big disappointment. Althouth the hardware was good, the components provided with the interface were not. Two bad transistors caused the print head to burn out in 20 seconds flat. Also, the documentation was among the worst I have ever seen.

Self Zapping

The printer solenoids are driven by software. It is possible to stop the microprocessor unit MPU with the needle solenoids engaged and in 20 seconds they will overheat and zap themselves. Additionally, the routines provided did not work and were written in a nonstandard Assembler language and were not documented.

As far as software goes, I have extended Basic running as well as a disk assembler. I am currently debugging a disk-oriented text editor with automatic memory management. I have written and am using a disk I/O package that supports open/close/rewind, read/write blocks and get/put records. A

(Continued on Page 56)

Micro Bytes

Osborne Publishes Programs in Basic

BERKELEY, Calif. — Osborne & Associates, Inc. has published *Some Common Basic Problems*, by Lon Poole and Mary Borchers. The book is a compilation of programs written in Basic that perform a variety of common tasks.

The book does not teach the user to program in Basic, and users can utilize the programs in the book whether they know how to program in Basic or not. All programs are written in a restricted subset of standard Basic and should be compatible with many versions of that language currently available to microcomputer users, a spokesman explained.

Options are included with some programs to allow the user to change the input or output format of the original program, he said.

The book consists of 76 programs and is available for $7.50 from Osborne at P.O. Box 2036, Berkeley, Calif. 94702.

INTERFACE CHART

COMPANY	PRODUCTS PURCHASED	QUALITY	DOCUMENTATION	DELIVERY	SERVICE	PRICES
Mits, Inc.	Altair 8800, various boards	Good	Good to Excellent	—	Slow	Generally Higher
Processor Technology	Sol System, various boards	Excellent	Excellent	Very Slow	—	—
Imsai	Imsai 8080	Good	Good to Excellent	Not Bad	—	High
Mini Micro Mart	Surplus Items, various boards	Poor	Very Poor	Not Bad	—	Low
Godbout Electronics	Chips, various boards	Good	Fair to Good	Excellent	Excellent	Low
North Star Computers	Disk drives, controller, Basic	Excellent	Good to Excellent	Good	Excellent	Middle to High
Technical Design Labs	Various boards	Excellent	Excellent	Good	—	Middle
James Electronics	Parts	Excellent	—	Excellent	—	Low to Middle
Poly Packs	Parts	Poor to Good	—	Fair to Good	—	Low to Middle
Cromemco	Various Boards	Excellent	Excellent	Good	—	Middle to High
Digital Group	Various CPUs, boards printer, cassette	Hardware — Good to Excellent Software — Poor to Fair	Poor	Poor to Good	—	Middle to High

Doug Anderson evaluates products and firms with which he has dealt in the past three years.

Tired of being last on the routing list?

Subscribe yourself.

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Board Bows

WESTLAKE VILLAGE, Calif. — Vector Graphic, Inc. has introduced a board with 1K byte of on-board random-access memory (RAM) and a capacity for up to 12K bytes of 2708-type erasable programmable read-only memory (Eprom).

The board occupies two independently addressable 8K-byte blocks and complete addressing flexibility is provided to conform to any system configuration with a minimum of address jumpers required, a spokesman claimed. Video boards or disk operating systems can be nested in the 3K bytes of unused space, he added.

The board costs $135 in kit form and $175 assembled from the firm at 790 Hampshire Road, A-B, Westlake Village, Calif. 91361.

Tele Speed Has Serial Printer

SYOSSET, N.Y. — Tele Speed Communications, Inc. here has introduced a dot matrix serial impact printer for the microcomputer hobbyist.

The Model 81 printer is an 80 char./-sec, 80-column, bidirectional asynchronous printer. It comes complete with electronics, power supply and cabinet. The printing medium is friction-fed pressure-sensitive paper.

The unit's paper advance and carriage are stepper-motor driven, permitting the unit to be used for graphics or as a plotter, the spokesman added.

The printer with parallel Ascii interface costs $615 and deliveries will begin in December, the spokesman said. Tele Speed can be reached at P.O. Box 647, Syosset, N.Y. 11791.

Development Support Offered

CUPERTINO, Calif. — Zilog, Inc. has introduced a program development system, the Z80-PDS, to provide support for developing and debugging Z80-based mirocomputer programs.

The standard Z80-PDS includes a floppy disk drive with up to 300,000 bytes of on-line data storage, internal memory consisting of 3K bytes of programmable read-only memory and 16K bytes of random-access memory and serial I/O with RS-232 or strapable current loop interface, according to a spokesman.

System Expandable

The system is expandable to provide additional I/O or terminal capability and can also be used as a general-purpose microcomputer.

The serial I/O feature allows the use of CRTs or hard-copy devices with rates from 110 bit/sec to 19.2 kbit/sec.

Software for the system includes a disk-resident operating system, editor, assembler, debugger and file handling utilities.

The system costs $2,850 from Zilog at 10460 Bubb Road, Cupertino, Calif. 95014.

Gnat Introduces Micro Compiler

SAN DIEGO, Calif. — Gnat Computers, Inc. has introduced a Fortran compiler for its Minifloppy/Microcomputer system.

The compiler includes all Ansi-standard Fortran, X3.9-1966, except for double-precision and complex numbers, which will be available at a later date, a spokesman claiemd. In addition to the compiler, a relocating assembler, a linking loader and Fortran library are included. Fortran function are implemented with 32-bit floating-point arithmetic and integers are implemented with 16 bit numbers, the spokesman explained.

The Fortran can be purchased for $500, which includes a single copy and documentation. Gnat is at 7895 Convoy Court, Unit 6, San Diego, Calif. 92111.

Builder Shares Kit Experiences

(Continued from Page 55)

Prom resident monitor with device independence, program relocatability, spooling and procedure library is also in development. After these projects are complete, I plan to develop a linking loader, sort/merge and commercial Fortran compiler.

Incidentally, for the privilege of being a Canadian, I have to spend about one-third more than an American for the same product. Of the $6,000 I have spent so far, about $1,500 has gone directly to the Canadian government in customs duties and taxes. Say, for example, I buy a memory board for $100. The exchange rate costs me $8, shipping $4, and customs, which is 10% and is figured on cost and exchange, will run $11. Finally, a 12% federal sales tax — which is figured on cost, exchange and duty— will run $14 for a total of $137 for the $100 board.

One of the most important things I have learned through all of this is that there are many "hidden gotchas" to look out for in hobbyists kits.

Anderson is a hobbyist in Ottawa, Ontario.

WANG'S PCS-II

THE END OF THE LINE FOR INTELLIGENT TERMINALS.

Wang's PCS-II. The small business computer that makes intelligent terminals obsolete. And introduces a whole new world of Distributed Data Processing.

Endowed with commercial BASIC and exclusive Wang minidiskette storage, the PCS-II delivers direct access data processing capabilities no ordinary terminal can. And with Wang's programmerless "EASYFORM" forms building and data-entry language, the PCS-II is a hands-on winner in any data-entry or forms-processing environment.

Wang modularity lets you expand memory, communications or peripherals as your needs grow. Or new technologies as they develop. Directly at the operator site.

The PCS-II even gives you a price tag no intelligent terminal can match—just $6,200. With 50K memory, dual minidiskette drives and bisynchronous 2780/3780 communications it's still only $9,200.

Hungry for more intelligence? Call your local Wang office or mail this coupon to PCS-II Product Sales, Dept. DDP, Wang Laboratories, Inc., One Industrial Ave., Lowell, Massachusetts 01851.

I'm hungry. Send me information on Wang's PCS-II.

Name _____

Title _____ Phone _____

Company _____

Address _____

City _____ State _____ Zip _____

DP72/CW97

YOUR OFFICE IS WAITING!

The solution for a fully staffed, furnished, luxurious office with a prominent address, eliminating capital investment, and long leases. Monthly programs from $150 to $650.

ATLANTA OFFICES: Downtown-Peachtree Center and Suburban-Powers Ferry Landing/ **(404) 955-1040**

CHICAGO OFFICES: on North Michigan Ave. at Ontario St./**(312)751-2700**

HOUSTON OFFICES: Downtown-Allen Center and Suburban-One Woodway Dr./ **(713) 965-0060.**

NEW YORK OFFICES: the Chanin Building at Grand Central Station/**(212) 867-5750**

OR WRITE FOR BROCHURE: Jewell Taylor, Omni Offices, Inc./10th Floor/ One Allen Center/Houston, Texas/77002

• MAIL SERVICES • INDIVIDUAL TELEPHONE COVERAGE • SECRETARIES • LOBBY DIRECTORY • PHOTOCOPIERS • CONFERENCE ROOMS • TELEX • TWX • OFFICE STAFF • RECEPTIONIST

Finally...
a word processing system that does things your way

Our new word processing system—ForeWord™—gives you the flexibility you need to fit today's advanced technology to your work environment...at a price your business can afford.

More than an automated typewriter

ForeWord is a shared logic system that uses a Four-Phase computer with up to 16 video display stations and 16 printers to help your staff prepare letter-perfect correspondence in a fraction of the time once required. Either in a central location. Or in individual offices. Or both with the same system.

Ideal for manuals and proposals

ForeWord can also be used for direct composition, editing, and final typing of the large documents that once tied up your staff for days. Paragraphs can be retrieved from local storage and updated, chapters reorganized...all at computer speed. And all while other operators are performing their independent tasks.

Nationwide support

ForeWord uses the same proven hardware as our distributed processing systems, and is backed by the same network of experienced service personnel in strategic locations throughout the country.

For more information, call your local Four-Phase office. Or write us at the address below.

Four-Phase Systems

10700 North DeAnza Blvd., Cupertino, CA 95014

TM—Trademark of Four-Phase Systems, Inc.

MICROCOMPUTER ADS

Where to find bargains, buyers, programs, peripherals or personals.

8080 MULTI-TASKING DOS AVAILABLE. Fast, real-time operating system. Multi-sessioning, multi-user DOS supports 20+ terminals. Features dynamic memory allocation, 35 system functions with line and block editors, system log, user accounting and password protection. Assembler/linkage editor support program development. Also have multi-user BASIC compiler producing reentrant code. MVT MICROCOMPUTER SYSTEMS, INC., 21822 Sherman Way, Canoga Park, CA 91303 (213) 348-2030.

MICROCOMPUTER SOFTWARE Real-time, multi-tasking operating systems available for the 6800, 8080 and PDP-11. Relocatable assembler/linking, loader for the 8080 runs on 16-bit minicomputers and IBM 370. Industrial Programming Inc., 9 Northern Blvd., Greenvale, N.Y. 11548 (516) 621-8170.

KIM-1 FREE TO SEMINAR ATTENDEES. A three-day short course on Microprocessing Fundamentals. Learn on a KIM-1 which you retain after the course. Price of $595 includes KIM-1, manuals and software. Cities & State Dates: Atlanta — 9/12; Boston — 9/19; Washington — 9/26; Detroit — 10/5; St. Louis — 10/12; Chicago — 10/19; Dallas — 10/26; Cleveland — 11/2. Phone the American Institute (201-377-7400) for details on the KIM-1 course.

THE TRICKS OF THE EDP PROFESSIONALS — $$ Save time and money developing business systems — Learn from the pro's with this how-to manual. Send only $14.95 plus $1.50 postage and handling to: EDP Professionals, Dept.-C9; 2596 De-Foors FY RD NW; Atlanta, Ga 30318.

OPPORTUNITY FOR BUSINESS MICROCOMPUTER DEALERSHIPS. Write or call us if you are interested in being a dealer for a complete micro stand-alone business system. We have developed CPA approved business packages in application modules. Free programming support to customers and complete leasing and maintenance plans available. California Microcomputer Company, 329 Flume Street, Chico, CA 95926 (916) 891-1730.

NEED FORTRAN BUSINESS/SCIENTIFIC SOFTWARE. will purchase/license. SBDS 11122 East 47th Avenue, Denver, CO 80239 (303) 371-3150.

Processor Technology SOL-20 for sale. $1,000. Includes 16K memory. Reply Michael Jones, 110 Twinbrook Perrysburg, Ohio 43551.

FOR SALE: HP9830A. Call (312) 432-2998.

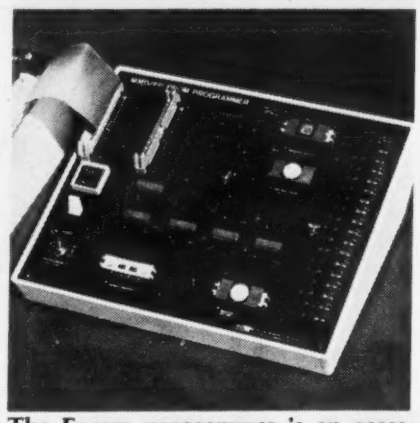
Unit Programs Eprom Chip

DERBY, Conn. — A programmer for the 1702A erasable programmable read-only memory (Eprom) chip has been introduced by E&L Instruments, Inc. as an accessory to the firm's MMD-1 microcomputer.

By sharing MMD-1 circuitry, the device can be used to program a 2K-bit Eprom chip in about four minutes, a spokesman claimed.

A 1702A Eprom chip installed in the programmer will accept data from any block of MMD-1 memory as well as from any chip designated as a master to be copied. After programming, the Eprom's contents can be verified.

Data transfer between the programmer and MMD-1 takes place over a sembly. The unit costs $222 assembled 40-pin connector and ribbon cable as-



The Eprom programmer is an accessory to the MMD-1 microcomputer.

and $166 in kit form from E&L at 61 First St., Derby, Conn. 06418.

Hobby Havens

As a service to hobbyist readers, Computerworld *periodically will list the micro clubs in different parts of the country. Clubs wishing to be included in this listing should send their name and address as well as the name and address or telephone number of a contact person to Frank Vaughan at* Computerworld, *797 Washington St., Newton, Mass. 02160.*

ARIZONA

Arizona Computer Society. Contact: Jim Schaefer, P.O. Box 14391, Phoenix, Ariz. 85063. Telephone (602) 846-0709.

FLORIDA

Space Coast Microcomputer Club. Contact: Ray O. Lockwood, 315 Inlet Ave., Merritt Island, Fla. 32952. Telephone (305) 452-2159.

MINNESOTA

Minnesota Computer Society. Contact: Jean Rice, P.O. Box 35317, Minneapolis, Minn. 55435.

Southeast Minnesota Amateur Computer Society. Contact: J. Michael Anglin, 6912 N.W. 18th Ave., Rochester, Minn. 55901. Telephone (507) 282-9748.

MICROCOMPUTING CLASSIFIED EXCHANGE

This special classified section in solid (non-display) format is designed for people who are working with or interested in microcomputing. Through it, you can buy, sell or swap equipment software or services; contact people with similar interests; start clubs; disseminate information; look for game partners; or send messages to other individuals. As the number of ads increases, this section becomes more useful; so we've tried to make ad placement as simple and inexpensive as possible. Details are as follows:

Ordering: The attached form will serve as the simplest way, we feel, to place your ads in Microcomputing Exchange. Please do not use it for other classified sections of Computerworld. They are display format and have different procedures and rates. Publisher reserves the right to refuse ads for this section, to limit the size of ads placed, and to limit the number of ads placed by any one person or company.

Payment: Must accompany your order. No exceptions. Your check will be accepted.

Copy and Closings: Deadline for copy to be in our hands is Friday, ten days preceding Monday issue. All copy must be submitted in writing (no copy taken over the phone), clearly typed or printed. We cannot be responsible for errors in printing made from illegible copy.

Rates: 80¢ per word. All words set in same size and typeface, up to first five words may be boldface. In making word counts, include name and address. Name of city (New York) or state (New Jersey) counts as two words. Zip code or phone number (including area code) counts as one word. (Publisher reserves right to omit zip code and/or abbreviate words if space is tight.) Count each abbreviation, initial, single figure or group of figures or letters as a word. Symbols such as RAM, CRT, etc. count as one word. Hyphenated words count as two words. No commissions paid to agencies.

Box Numbers: Are available at $5.00 per insertion. Send replies to box numbers to:
Box XXXX
Microcomputing Exchange
Computerworld
797 Washington Street
Newton, MA 02160

Order Form

TO: Microcomputing Exchange
Computerworld
797 Washington Street
Newton, MA 02160

I have read the rules, and would like to place my ad as follows:

Date of first appearance (or "next available issue")_____

Number of weeks ad is to run: _____

Box number desired (add $5.00)_____

COPY: (Attach copy on typed or printed page if you wish. Please be legible. Circle up to first five words for boldface.)_____

_____

_____

_____

_____

_____

_____

Total words @ 80¢ each equals _____
Plus Box Charge (if any) _____
Equals total cost per insertion _____
Times total number of insertions _____
Equals total enclosed _____

Name _____

Signature _____

Address _____

City _____ State _____ Zip_____

Phone where you can be reached during day ( ) _____

As Market Soars

Bubble Memory Prices to Drop: Study

By Toni Wiseman
CW Staff

SAN JOSE, Calif. — Bubble memory components for small systems will sell for 6 millicents per bit in 1981, a year in which the market will total $180 million.

That same year, bubble memory components for disk replacement will sell for 3.6 millicents per bit with a market totaling $72 million, according to a recent report by Small Business Systems.

The study made several dramatic statements on the market impact of bubbles. For instance:

• "The gap filler or Fast Access Memory (FAM) role will be taken by charge-coupled devices (CCD). Little effort will be made to improve bubble memory shift rates.

• "Bubble memory chip capacity will exceed random-access memory (RAM) chip capacity by an average factor of better than 10 to 1 between 1977 and 1981.

• "IBM will announce bubble memories in a product before 1980. The system will be configured to discourage attachment of non-IBM peripheral memory devices."

Small Business Systems noted that bubble memory is similar to semiconductor technology in that Bell Laboratories controls many of the patents.

"Bell has taken a stance in bubble memory technology similar to that in semiconductor technology: Licenses are available at a relatively modest fee plus royalty. This means that no company will be able to become dominant through its patent position; this should ensure a competitive market for some years to come," the report suggested.

Entry into the bubble memory market is an expensive proposition at this point in time since there is little equipment which uses the technology and therefore no significant sales volume. Small Business Systems estimated that a new component manufacturer would have to announce its product and then wait between 18 months and two years for volume usage to begin, all the while bearing the high fixed cost of bubble memory manufacturing operations.

Once the market develops, however, the firm estimated that the necessary $1.8 million capital expenditure for a bubble memory line will be less than that required for a new semiconductor line, marking it appear attractive to a component supplier.

Market Forecasts

"The rate of growth of bubble memory sales is limited by two factors: the design time required to bring products using bubble memories to market and the ability of manufacturers to expand their capacity to meet demand," the report stated.

While an 18-month "dry" period between the introduction of a component and its first volume sales can normally be sustained by manufacturers because the capacity of their production lines is absorbed by more mature products, bubble memory lines make only bubble memories. This means the capacity of the production line is unabsorbed and it is likely the first manufacturers to announce products will sustain heavy losses until sales build up, it said.

Despite this fact, Small Business Systems forecast new suppliers will enter the market by 1979 or 1980, joining Texas Instruments and Rockwell — the only current suppliers.

The study predicted two significant events will occur in the 1979-80 timeframe; the entry of new suppliers will make prices more competitive and the lower prices and higher industry capacity will cause bubble memory suppliers to seek to enter the disk replacement market.

The estimated 1977 U.S. memory market will be dominated by RAM memories (60%), followed by disk drives (26%), tape drives (6%), FAM (4%), floppy disk drives (3%) and mass storage (1%), according to Small Business Systems' figures.

The size of the RAM market has always attracted the semiconductor industry, whose constantly growing productive capacity demands a very large market. Small Business Systems expects the same scenario will be repeated in the disk market and, while bubbles are not semiconductors, fabrication techniques are similar and should not be difficult for a semiconductor firm to master.

IBM Entry

"In addition, the projected entry of IBM should legitimize the application. IBM may well introduce bubble memories in a new system in such a way that it is impossible for add-on memory suppliers to duplicate the memory without access to bubble technology.

"This would cause these suppliers to seek access to the technology and create an IBM-compatible bubble memory market similar to the present add-on memory markets. This, in turn, would stimulate the merchant market for bubble memories," the report said.

The small system bubble memory market should grow from 12,000 units in 1977 to 1.2 million in 1979 and 3 million in 1981. Bubble sales during that time will rise from $4.8 million in 1977 to $92.4 million in 1979 and $180 million in 1981, it added.

The report — *Bubble Memory — Impact and Opportunity* — is available from Small Business Systems at Suite 230, 4320 Stevens Creek Blvd., San Jose, Calif. 95129.

Five Years, 40 Members Later, CCIA's Influence Still Growing

By Edith Holmes
CW Staff

WASHINGTON, D.C. — It all began with an association with a one-year charter whose "whole purpose was to get U.S. vs. IBM off the dime."

Today, five years later, the Computer and Communications Industry Association (CCIA) aspires to be the spokesman for these industries in a broad range of issue areas.

The membership push is on. "We must double our membership" if the association is to meet the expenses of covering the capital formation, standards and competition issues it sees in the computer and communications industries, according to A.G.W. (Jack) Biddle, the CCIA's president.

During the meeting of its member companies' executive officers in Chicago in August (CW, Aug. 29), the CCIA formally established a new category of membership: associate member, which is open to user organizations and to institutions — such as banks and investment firms — that are concerned about the future, Biddle said.

The CCIA hopes its drive will attract between 50 and 60 companies — yielding about a one-to-one correspondence with its corporate membership of 40 firms. The association expects to attract the more sophisticated users, the multivendor shops.

"It behooves the user, particularly the sophisticated user with a million-dollar DP bill and a million-dollar phone bill, to come forward and be active in the issues facing these industries," Biddle stated.

Interest Aroused

Long a proponent of user involvement in DP, and more recently in the communications scene, the association conceived of its new membership category in the wake of IBM's 3033 system announcement. Eleven companies, all with over $200 million in annual revenues, called the CCIA to express concern over IBM's plans and to express interest in the association, Biddle said.

Five years ago, in Encino, Calif. seven beleaguered plug-compatible peripheral manufacturers (PCMs) banned together un-

(Continued on Page 60)

DEC LA-36 SINGLE UNIT YEAR END SPECIAL!

$1,375*

*Offer ends Dec. 15, 1977

From DDI, America's leading terminal supplier.

This is just one of DDI's special year-end offers. Whatever your terminal needs, we offer you the market's finest values—and we're prepared to prove it!

With DDI, you also get:

- A single source for DEC, TI, ADDS, DIABLO, OMNITEC, TECHTRAN.
- Full range of new products.
- Choice of rent/lease/buy plans.
- Unique Combination Savings Plan.
- Nationwide maintenance service.
- Nationwide branch network for prompt response to your needs.

Data Dimensions, Inc.
51 Weaver St., Greenwich, Ct. 06830
TEL: (203) 661-1700

Branch offices: New York City • Morris Plains, N.J. • Philadelphia (Cherry Hill, N.J.) • Washington, D.C. • Detroit (Southfield) • Chicago • Atlanta • Dallas • Houston • Los Angeles (Encino) • San Francisco

Five-Year-Old CCIA Gaining in Influence

(Continued from Page 59)

der the title "Computer Industry Association" (CIA) to blunt the battering they were taking from IBM through leasing plans, tape drives and disk drives.

Early on, however, the association realized if it was to speak for the industry, it had to broaden its interests and understanding beyond that of the PCMs, Biddle noted.

By that time, though, the anti-IBM image had already been created. The anti-AT&T image quickly followed. From the viewpoints of those giant corporations, the association might as well have been the federal CIA.

Biddle maintains that today's CCIA is a different organization from the fledgling band of five years ago, with a different member complexion, a different leadership.

"Monitoring and affecting the competitive structure of the industry is still considered the highest priority of the association by its member companies," Biddle added.

But CCIA notions of just how that competitive structure is to be achieved have mellowed and matured.

Broad Membership

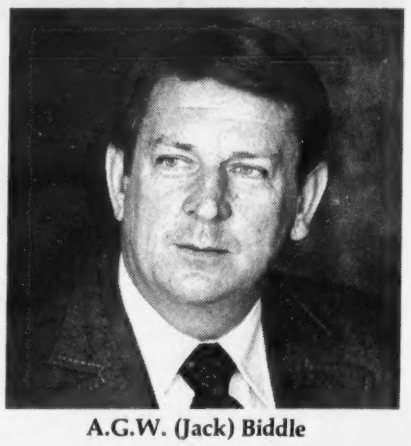
The Association's membership is sufficiently broad — including Amdahl and Itel, software firms, all forms of peripherals companies, terminal makers and third-party leasing outfits — and its stance on issues is consiliatory enough that it can join with either IBM or AT&T to urge a more competitive industry structure.

The CCIA cooperated with IBM in filings before the FCC concerning AT&T's Dataspeed 40/4 offering and the second Computer Inquiry, and the association aligned itself with AT&T concerning IBM's Satellite Business System venture.

Perhaps the CCIA has learned that antitrust suits don't provide the only means available to make an industry more competitive.

"The computer industry is 30 years old. For almost 20 years, there has been litigation pending against IBM. We have to stop that because it affects everybody, including IBM and users," Biddle said.

Certainly, the progress toward relief achieved thus far in both U.S. vs. IBM and U.S. vs AT&T has shown that there must be other avenues leading to more open markets, Biddle suggested.



A.G.W. (Jack) Biddle

Beyond the court cases, however, the association firmly believes that the computer and communications industry and its marriage with communications intensify "the situation of the nation as a whole" in that these fields are capital intensive, Biddle said.

Capital Formation

Capital formation is a key, crucial issue and one that must be resolved soon if the computer and communications industries in particular and the nation as a whole are to continue to raise new entrepreneurs, the CCIA president added.

The issues the association hopes one day to represent rapidly become global problems driven, chiefly, by the rising cost of energy, Biddle suggested. The CCIA's concern for the recreation of the competitive structure of the economy has led to its worry that small and medium-sized businesses are not sufficiently represented before the federal government.

The CCIA would like to work more closely with organizations like the National Small Business Association, but a lack of manpower makes working with others difficult, Biddle said.

Again, membership is crucial. In this area, as in the fields of interest to users, investment firms and the specialized common carriers, the CCIA plans to increase its current staff of 12 people. It will add at least one person per interest area to take care of the needs of each of these groups as soon as they join the association in sufficient numbers to provide the necessary funding, the CCIA president said.

The CCIA stands the best chance of representing the entire industry because it opens its membership to all segments of the industry, unlike the other two computer and communications industry representatives in the nation's capital — the Computer Business Equipment Manufacturers Association (Cbema) and the Association of Data Processing Service Organizations (Adapso), Biddle said.

But can the CCIA represent the computer and communications industries without IBM, "the seven dwarfs," AT&T and the other carriers? No, not the entire industry, Biddle said.

Maybe the threat of government regulation of the computer industry would bring IBM closer to the association. Maybe it is currently in the CCIA's interest not to have AT&T and IBM as members, equal though all the association's members might be. Maybe in five more years . . .

We knew it from the beginning. And, so did our customers. We were convinced from the start that static RAM technology was the way to go on our 370 add-on memories. Static is faster. More reliable. And, totally compatible with IBM.

Now, we see an interesting thing happening. Our competitors, long-time proponents of dynamic technology, have suddenly changed their tunes. They're now planning to jump on the static bandwagon. But, they have a long way to go. We spent two years to develop our static technology before we started delivering it in 1975. We were the first with an NMOS static chip. The first with a 4K chip. And, our new 4K chip is the fastest, static or dynamic. All from EMM's own semiconductor facility in Phoenix.

Evidently, recent IBM enhancements have left some of our competitors holding the bag. We knew from the beginning that complete IBM compatibility requires static technology. We've kept right up with IBM. And that's how our customers are always going to be up-to-date with future IBM enhancements.

When you need add-on memories, check with EMM. We've got the best total all-around add-on-memory package going. We'll see to it that your memory stays IBM compatible.

EMM: STATIC FROM THE BEGINNING

COMMITTED TO MEMORY ALL THE WAY

EMM COMPUTER PRODUCTS
A division of Electronic Memories & Magnetics Corporation
3216 West El Segundo Boulevard, Hawthorne, CA 90250

For more information, call your regional EMM sales office. Eastern (201) 845-0450. Central (321) 297-3110. Western (213) 477-3911. Europe: Bad Homburg, West Germany 06172/6094

Foreign Share to Drop 8%

ADL Sees U.S. Losing Edge in World Market

By Molly Upton
CW Staff

NEW YORK — By 1981 the installed value of the non-U.S. computer base could exceed that of the U.S., according to a five-year forecast from Arthur D. Little, Inc. (ADL) that was entered into evidence in the U.S. vs. IBM antitrust trial here.

The rest of the world could contain 52% of the world total installed base of general-purpose computers by that year, ADL said in its study on "The World Computer Industry 1976-1981."

At the end of 1976, nearly 47% or $40.9 billion of equipment was located outside the U.S. The value of general-purpose computers worldwide was $87.4 billion, the report indicated.

By 1981, the non-U.S. installed base will be about $78 billion, or 52% of the world total of between $140 and $155 billion, according to ADL. This represents an increase in value of over 90% during the next five years.

U.S. manufacturers' share of the foreign market should drop from 71% to 63% by 1981, although the value will grow from $29.3 billion to $49.2 billion, up 68%, the report indicated.

The principal reason for the reduction will be the increasing nationalistic efforts by local governments, although the difficulty in distinguishing between U.S.-affiliated and foreign firms because of international combinations will also be a factor, the research firm said.

ADL estimated a 9% annual growth rate for the U.S. installed base and an annual 12% abroad, assuming an average real gross national product growth rate of 3% annually for Western Europe and 5% for Japan in the 1976-1981 period.

Looking at various regions, ADL said U.S. makers should increase their base in Canada from $2.3 billion in 1976 to between $3.8 billion and $5 billion in 1981.

The U.S. portion of the Western Europe base should grow from $21.2 billion to between $30 billion and $38 billion while Eastern Europe should jump from $.2 billion to between $.6 billion and $.8 billion during that same time frame, the report continued.

The U.S. piece of the Japanese pie will grow from about $2 billion to between $3.2 billion and $4.8 billion, the report added.

The only region in which the U.S. share is supposed to increase is Eastern Europe, where the base should include 10% from U.S. shipments, up from the 5% in 1976.

The total base there should grow from $3.3 billion in 1976, to either $5.5 billion or $7.5 billion in 1981.

ADL expects more countries to concentrate on developing minicomputers rather than larger systems.

In Western Europe, the value of computer systems installed is expected to rise 50% to 90% to the $37 billion to $47 billion range by the end of 1981, ADL forecast. The wide range reflects the uncertain economic situation and its dependence on exports and petroleum imports.

During 1976, general-purpose computer systems in use in Western Europe increased in value by 15% to $24.6 billion, the report observed.

The U.S. share of the Western European market should decline from about 86% to 81% in 1981, principally because of "stronger participation of indigenous manufacturers in the fields of minicomputers and small business systems," it said.

Trial Documents

94% DISCOUNT
IN QUANTITIES OF ONE

Why spend $150,000 or more for a firmware system when our's can give you the same End results for less than $300/mo. (60/mo lease plan). Remember us! We're that "FREE SOFTWARE" company that provides you with thousands of dollars of software for just a little more than the cost of the paper its' printed on. NOW we are going to virtually give away our "Firmware System" at mere fractions of everyone else's prices. How can we do it? Well — Just like we did with our software; by providing a quality product at very nominal prices and relying on volume for our profit instead of making it off you! Unlike some of the other advertised systems we offer a TOTAL system package with mass memory, video display, line printer, operating system, plus a full Application Software Library. Software packages available with the system include: Payroll, Inventory, General Ledger, Medical Record Keeping, Word Processing and more. Entire package includes everything above plus system tutorial, more than 600K Bytes of formatted disk storage and over 65K Bytes of RAM. Assembled and ready to use. Complete Unit price $8999 plus shipping. Leasing plans and national service available from any of our 134 dealers.

S.R.I.
1712-C Farmington Court
Crofton, MD 21114
(301) 721-1148

42,178 buyers attended the 1977 Computer Caravan 9-city tour... that's an increase of 32%

Thousands of computer buyers from all across the country are planning to attend one of the 1978 Computer Expos. They'll be there to gather information about a variety of products and services, evaluate the companies who supply them, and select the ones that best meet their needs.

If you're marketing computer products or services, then you'll want to be in one or more of the regional Computer Expos beginning in March. How else can you meet well over 50,000 computer buyers across the country in just nine short weeks?

Computer Expo '78 is part of a nationwide Conference and Exposition program, which each year serves the computer community by bringing nine regional Computer Expos to the most important business areas in the U.S.

You'll want to exhibit at one or more of these shows, but for PRIME positioning, you've got to reserve space NOW.

For complete information on how the 1978 Computer Expo tour can work for you, use the coupon below or call Kim Wichert at (617) 964-4550 (collect).

Keep in mind, your prime prospects will be at Computer Expo '78... so will your competition.

1977 Computer Caravan

Attendance by Management Function

	San Francisco	Los Angeles	Cleveland	Minn/St. Paul	Chicago	New York	Philadelphia	Washington D.C.	Boston	Total
Corporate Officers	784	962	442	284	849	1,172	458	333	671	5,955
Systems Mgrs & Operation Mgrs	1,619	1,665	1,115	944	1,995	2,403	1,131	1,009	1,182	13,063
Programmers & Analysts	998	1,138	662	688	1,381	1,338	729	532	712	8,178
Engineering Mgt & Engineers	709	847	380	309	727	662	307	255	641	4,837
Sales & Marketing Personnel	353	371	241	215	385	592	204	187	410	2,958
Consultants/Accpuntants	299	293	133	115	381	576	190	151	381	2,519
Librarians/Educators/Students	209	311	192	157	207	264	127	98	121	1,686
Others	370	411	279	265	471	445	249	225	267	2,982
Total	**5,341**	**5,998**	**3,444**	**2,977**	**6,396**	**7,452**	**3,395**	**2,790**	**4,385**	**42,178**

Attendance by Industry Classification

	San Francisco	Los Angeles	Cleveland	Minn/St. Paul	Chicago	New York	Philadelphia	Washington D.C.	Boston	Total
Computer Manufacturing or DP Hardware/Peripherals	976	1,132	486	536	658	902	249	143	823	5,905
Manufacturer (Other)	551	912	789	548	1,480	1,039	648	130	736	6,833
Serv Bur/Sftwr/Plnng/Consult	710	978	390	255	745	1,049	506	375	558	5,566
Pub Util/Comm Sys/Trans	355	244	248	217	418	599	240	137	199	2,657
Wholesale/Retail Trade	310	288	191	227	410	472	154	99	253	2,404
Finance/Insurance/Real Estate	594	576	336	266	813	1,055	482	384	344	4,850
Mining/Const/Petroleum/Ref	105	104	68	26	119	87	59	30	119	717
Business Service (Except DP)	143	141	78	57	216	271	104	47	166	1,223
Education/Medicine/Law	478	568	305	340	595	679	379	260	405	4,133
Government-Fed/State/Local	693	541	262	206	384	288	280	902	275	3,831
Prntg/Publish/Other Comm Serv	101	139	67	115	187	340	120	97	184	1,350
Others	325	375	224	184	371	547	174	186	323	2,709
Total	**5,341**	**5,998**	**3,444**	**2,977**	**6,396**	**7,452**	**3,395**	**2,790**	**4,385**	**42,178**

I'm interested in exhibiting in the following Expos:

To: KIM WICHERT
President
THE CONFERENCE COMPANY
60 Austin Street
Newton, MA 02160

☐ Have Sales Representative call me

☐ Send Brochure/Reservation Agreement

☐ Send Copy of 1977 Attendee Analysis

COMPUTER EXPO 78

☐ Southern California Computer Expo	Anaheim/LA	March 21-23
☐ Northwest Computer Expo	San Francisco	March 28-30
☐ Southwestern Computer Expo	Houston	April 11-13
☐ Southeastern Computer Expo	Atlanta	April 18-20
☐ Gateway Computer Expo	St. Louis	April 25-27
☐ Midwestern Computer Expo	Chicago	May 2-4
☐ Mid-Atlantic Computer Expo	New York	May 9-11
☐ Great Lakes Computer Expo	Detroit	May 23-25
☐ New England Computer Expo	Boston	May 30-June 1

Name _____ Title _____
Company _____
Address _____
City _____ State _____ Zip _____

Hewlett Explains Fundamentals of 'HP Way'

By Molly Upton
CW Staff

PALO ALTO, Calif. - What is the "HP way?"

"I feel that in general terms it is the policies and actions that flow from the belief that men and women want to do a good job, a creative job, and that if they are provided with the proper environment they will do so," according to Bill Hewlett, Hewlett-Packard Co. president.

"But that's only part of it.

Closely coupled with this is the HP tradition of treating each individual with consideration and respect and recognizing personal achievements," Hewlett observed in the firm's publication *Measure*, which was devoted to looking at how employees and officers explained the firm's philosophy.

Although Hewlett admitted this sounds "almost trite," he said he and cofounder Dave Packard have tried to operate the company along these lines since it first started.

In line with this confidence in, and concern for, people, the founders decided the firm should not be a "hire and fire" operation, he said.

"Perhaps the company's most important responsibility to its people is providing stability of employment."

In at least two instances, rather than cut the workforce, HP has shared the burden of a recession or imbalance of orders and production by reducing work hours and pay for those affected. The net effect is that the firm emerges fully staffed with capable people who have confidence in the company, according to the publication.

One corollary to the HP way is that "employees should be in a position to benefit directly from the success of the organization," he continued. HP developed a profit-sharing plan and an employee stock purchase plan, as well as medical insurance for catastrophic illness.

Each foreign country organization tailors its benefits to its own traditions, laws and values.

In the U.S., employees with more than six months of service are eligible to participate in the profit-sharing plan, which is calculated on HP's pre-tax earnings.

The U.S. stock option plan permits employees with at least one year of service to set aside up to 10% of base earnings to buy shares, which are issued quarterly at current market price. HP contributes 25% of the cost of the stock, Hewlett said.

Small Divisions

HP's policy of keeping basic business units, the operating divisions, small and well defined is designed to "give people a clear sense of their own mission and an awareness of their individual contributions to overall performance," he continued.

HP believes in developing its own management and has applied its own concept of management by objective.

"When stripped down to its barest fundamentals, management by objective says that a manager, a supervisor, a foreman given the proper support and guidance (that is, the objectives) is probably better able to make decisions about the problems with which he is directly concerned than some executive way up the line — no matter how smart or able that executive may be.

"This system places great responsibility on the individual concerned, but it also makes his work more interesting and more challenging," Hewlett said.

"It makes him feel he is really part of the company, and that he can have a direct effect on its performance," he continued.

The firm has a wide variety of company-sponsored training and development programs including apprenticeship programs combining on-the-job training and classroom instruction.

It also offers televised courses from universities in which the remote classrooms are equipped with audio communications to the instructors.

Individual's Worth

Stressing the importance of the dignity and worth of the individual, HP long ago eliminated time clocks and more recently introduced flexible work hours.

"This is meant to be an expression of trust and confidence in HP people as well as providing them with an opportunity to adjust their work schedules to their personal lives," Hewlett remarked.

The firm operates with an informal and personal atmosphere. Hewlett hopes it can retain this " 'family' way of operating with a minimum of controls and the maximum of a friendly 'help each other' attitude."

"You can't describe it [the HP way] in numbers and statistics. In the last analysis, it is a spirit, a point of view. It is a feeling that everyone is a part of a team, and that team is HP . . . It is an idea that is based on the individual.

"It exists because people have seen that it works, and they believe in it and support it. I believe this feeling makes HP what it is and that it is worth perpetuating," Hewlett said.

List of Concepts

A 1975 management meeting produced the following list of concepts embodied in the HP way:

- Belief in people; freedom.
- Respect and dignity; individual self-esteem.
- Recognition; sense of achievement; participation.
- Security; permanence; development of people.
- Insurance; personal worry protection.
- Share benefits and responsibility; help each other.
- Management by objective (MBO); decentralization.
- Informality; first name; open communication.
- A chance to learn by making mistakes.
- Training and education; counseling.
- Performance and enthusiasm.

Tran, SDC Plan Project

EL SEGUNDO, Calif. — Computer Transmission Corp. (Tran) and System Development Corp. (SDC) have agreed to combine their capabilities in a product development and manufacturing effort aimed at the commercial market sector in data processing and data communications.

The agreement includes a "significant financial investment" in Tran by SDC, making it a minority shareholder in Tran, according to Tran president Ray Sanders.

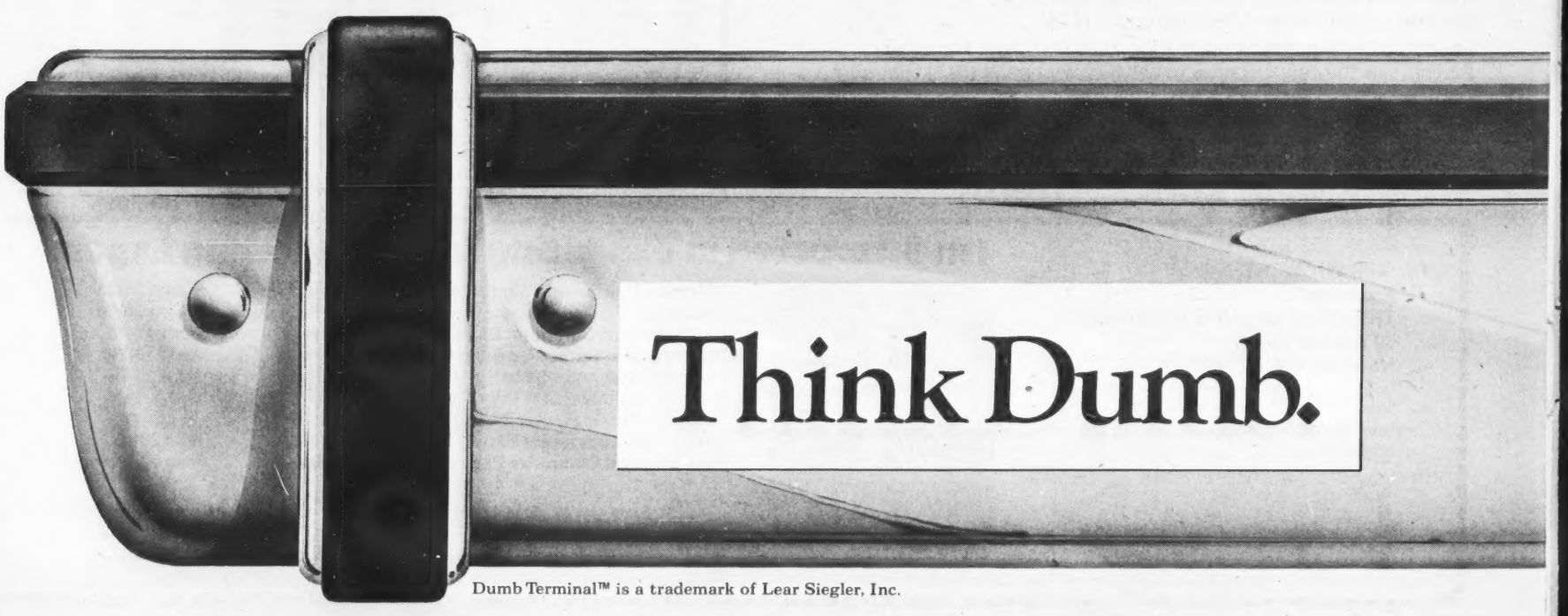
Along with the sharing of resources and techniques by the two companies, Tran will undertake the manufacture of products designed by SDC, as well as products resulting from cooperative efforts.

Details of the agreement were not disclosed.

Timetable Set

Diablo Systems, Inc. has established the production timetable for its Series 400 family of disk drives. The Models 411T (26.6M bytes) and 413T (53.3M bytes) will be available in October 1977.

Models 410T/F (13.3M bytes), 411F (26.6M bytes), 412T/F (40M bytes) and 413F (53.3M bytes) will be shipped in October 1978.



Dumb Terminal™ is a trademark of Lear Siegler, Inc.

Result of U.S. Recession

Data 100 Happy With Move to Expand Abroad

By Nancy French
CW Staff

MINNEAPOLIS — Data 100 Corp., a company that provides computer terminal systems for a wide variety of distributed data processing applications, has what many consider to be an unusually far-flung international operation for an organization of its size.

Not too long after Data 100's December 1968 founding, a recession hit the U.S. When that happened, the firm's founders were quick to see the advantages of becoming an international operation since, at that time, European countries were "out of phase" with the U.S. and business was still good there. As a result, in 1971 the company established its first fully owned subsidiary in the UK, according to William J. Bryant, staff manager for international business.

Today, six years and 13 wholly owned subsidiaries later, Data 100 doesn't regret the move, Bryant said in a recent interview.

The Minneapolis-based firm designs, manufactures, sells, leases and services products that are compatible with those of the major mainframers and intended for use at remote locations. The original products were oriented toward batch work — as well as interactive terminal systems.

It also produces minicomputer products, line printers and disk drives that it markets to other equipment manufacturers.

Its customers include large corporations, service bureaus, universities, financial institutions and government agencies in 22 countries, Bryant said.

Seventy percent of these customers use the firm's products in conjunction with a large IBM mainframe as the host computer, he said. The rest of the customers link Data 100 equipment to CPUs manufactured by Control Data Corp., Univac, Honeywell Information Systems and, in the UK, ICL, he noted.

Ambitious Growth

Having 13 wholly owned subsidiaries in Western Europe, a joint venture in Japan and distributor relationships in 15 other nations would be considered rather ambitious for a company the size of Data 100, a firm whose revenues in 1976 reached only $122 million.

Bryant explains it by saying, "Our compelling reason for expanding so quickly overseas is that 50% of the potential business for an American - based computer or peripherals company is outside the U.S. — especially for a firm like Data 100, whose customers are largely multinational corporations.

Data 100 took the route of wholly owned subsidiaries because it allowed the firm to give "better service to its customers," Bryant said.

Despite its 1,704-strong customer base, the company faces the need to raise capital constantly. Like most of IBM's competitors, Data 100 must lease 95% of its equipment rather than sell it outright.

Only last month, the firm raised $15 million in convertible subordinated debentures, Bryant noted.

But the future is bright, he said. Rather than replacing their large 370 mainframes with larger systems or by configuring them into dual processors, many users have begun to add functions remotely, using their 370s as hosts to a number of remote smart terminals with a controller or entire minicomputer systems. This trend bodes well for companies like Data 100.

"Customers are looking for additional functions and ways to do some processing out in the field — the local payroll, for example," he said.

Higher Level Languages

By using a higher level language with their terminal systems, users can run them as minicomputers, he said. Right now, Data 100 offers RPG on its tape-based Model 78 terminals. The next step is a disk-based model, followed by a product with a small data base capability, he said. The next language offering, of course, would be Cobol, but "that hasn't been introduced yet."

The firm's 80 series, the first part of which was announced earlier this year, will have more models with more capabilities announced throughout 1978, he said.

The 80 is advertised as a "multifunctioned series with all terminal functions plus processing. Voila, a stand-alone minicomputer system." But Bryant argues that Data 100, with its terminal controllers, has been in the minicomputer business all along. "We just didn't call it that."

And Bryant is also bullish about the firm's viability in the IBM world.

"Even if IBM changed its operating systems or interfaces, it wouldn't effect us directly," Bryant said.

"We're insulated by the telephone line, which is not in the hands of IBM," he said. Even if IBM's Synchronous Data Link Control (SDLC) becomes the de facto communications protocol, and that's likely to happen, according to Bryant, he feels it will replace the older well-established binary synchronous communications (BSC) protocol very slowly because users have spent years developing their BSC-type networks.

A.B. Dick Files Suits Against REI

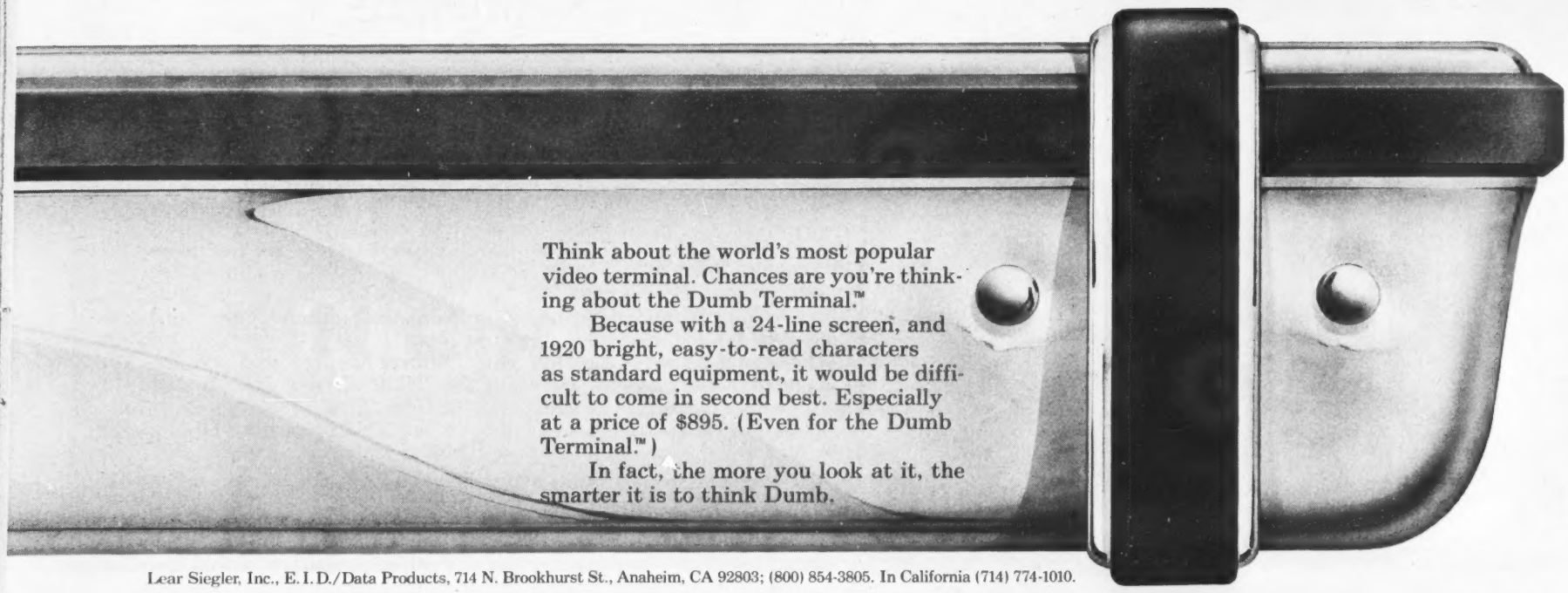
DALLAS — Recognition Equipment, Inc. (REI) has been named defendant in two lawsuits filed last week in Chicago by A.B. Dick Co.

The first suit, filed in the Circuit Court of Cook County, Illinois, alleges that royalties being paid to A.B. Dick by REI under an existing licensing agreement relating to an ink-jet printer patent are lower than required under the agreement. In the suit, A.B. Dick seeks to recover an unspecified amount for the alleged underpayments.

The second suit, filed in the U.S. District Court for the Northern District of Illinois, Eastern Div., alleges that REI, in the manufacture, use and sale of ink-jet printers, is infringing another patent under which A.B. Dick in the exclusive licensee.

A.B. Dick had previously offered REI a license under this patent. In this suit, A.B. Dick seeks to recover monetary damages of an unspecified amount and seeks an injunction against further infringement.

In responding to the two lawsuits. REI denied that A.B. Dick is entitled to recovery or relief under either of the suits and intends to oppose vigorously the claims made in both actions.


Think about the world's most popular video terminal. Chances are you're thinking about the Dumb Terminal.™
Because with a 24-line screen, and 1920 bright, easy-to-read characters as standard equipment, it would be difficult to come in second best. Especially at a price of $895. (Even for the Dumb Terminal.™)
In fact, the more you look at it, the smarter it is to think Dumb.
Lear Siegler, Inc., E. I. D./Data Products, 714 N. Brookhurst St., Anaheim, CA 92803; (800) 854-3805. In California (714) 774-1010.

ADABAS CHALLENGES EVERY OTHER DBMS!

Everyone says his DBMS is the best, but we want to prove it...with your data, on your computer.

Even Adabas isn't right for everyone, and if we're wrong, the test won't cost you a penny. (Obviously we're right a whole lot more than we're wrong, or we couldn't afford to make this offer.)

Adabas performs better, has more features, and is easier to use than any other DBMS. That's what survey after survey has shown. So now we'd like to show you.

We'll prove these Adabas advantages.

- The most cost-effective DBMS
- Low staffing requirements
- Flexibility in long-term maintenance
- Greater programmer productivity
- Easy-to-use reference manuals
- The best re-start and recovery capability
- Smallest on-line storage requirements
- Answers in seconds that used to take days
- On-line inquiry and reporting with "Adascript +"

Ground rules for the DBMS challenge.

Together, we'll set the evaluation criteria. Naturally, these will be based on measurable results of the benchmark.

Then we'll take on any other DBMS you can name. Of course, if we win, we assume you'll buy or lease Adabas. If you buy the loser (But why would you do that?) or buy nothing (Then why bother to play?), we'll have to charge $5,000. And even then, we'll be out $5,000 ourselves.

If we lose (which happens on rare occasions), we'll shake hands and wish the winner well. No charge, of course.

One more option.

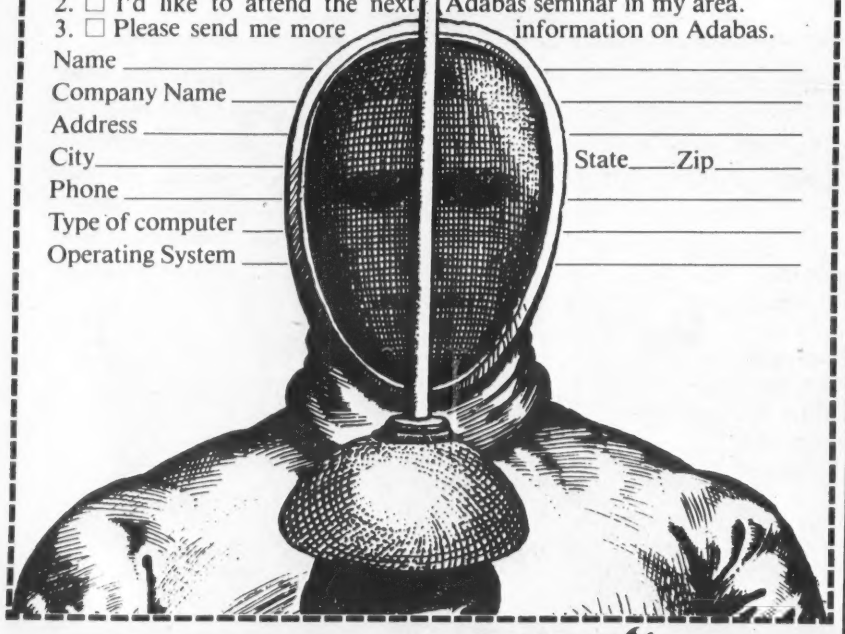
Even if you don't have time to benchmark, we'll be glad to demonstrate Adabas on your computer. If it doesn't do exactly what we mutually agree it should do... no charge, of course.

software ag
OF NORTH AMERICA INC

Reston International Center, 11800 Sunrise Valley Drive,
Reston, Virginia 22091. Phone: (703) 860-5050

1. ☐ OK, Show me! Please call to arrange a benchmark/ demonstration of Adabas.
2. ☐ I'd like to attend the next Adabas seminar in my area.
3. ☐ Please send me more information on Adabas.

Name _____
Company Name _____
Address _____
City _____ State ____ Zip ____
Phone _____
Type of computer _____
Operating System _____



Member SIA Software Industry Association

1976 Trade Results Mixed For Electronics Products

By Edith Holmes
CW Staff

WASHINGTON, D.C. — Foreign trade in high technology, electronics-oriented products showed mixed results in 1976, according to the department of Commerce's International Business Administration.

Computer and communications products were among the five industry groups registering some increase in their trade balances; calculator shipments were among the three industry areas experiencing a decline.

The net result of these cross-currents in the trade of electronics products was a deterioration in the overall trade surplus of these goods to $876 million in 1976 compared with with $2.2 billion in 1975, the Commerce Department said.

Total exports rose 19% above the 1975 level to $8 billion, while imports rose 57% to $7.2 billion.

Exports of most industry group products increased in 1976. Exports of computers and related equipment rose 16% to $2.6 billion; telephone and telegraph equipment was up 15% to $227 million; and electronic components rose 27% to $2.5 billion.

Mirroring exports, nearly all import categories experienced increases last year. Imports of computers and related equipment rose 82% to $235 million; telephone and telegraph equipment was up 8% to $100 million; and electronic components rose 39% to $1.6 billion.

Only imports of calculating and accounting machines declined dropping less than 1% to $335 million. This decline was attributable to price erosion, Commerce stated.

BCC Sees Strong Growth For Xerographic Printers

STAMFORD, Conn. — There will be a substantial market for xerographic printers if IBM adopts them as the standard printer in the late 1970s or early '80s, according to Business Communications Co., Inc. (BCC).

Currently, there are over 80,000 impact line printers throughout the U.S. By 1985, over 120,000 line (or page) printers will service 59,700 computers, BCC estimated, noting that 23,000 of these will be xerographic printers.

While this is only 19% of the total, it represents a tenfold growth in eight years, BCC pointed out in a recent report on high-speed printing.

Computer output microfilm (COM) is also an attractive concept, it noted, adding that since 1973 COM sales have increased 30% annually because of the increased costs of paper. But COM faces many objections, most psychological, which will ultimately limit the field, BCC suggested.

"COM usage will continue to grow, and this presents an excellent opportunity for service bureaus, but this growth simply doesn't translate into equipment sales," the report said.

Finally, plotters present a stable market, though one dominated by California Computer Products, Inc. BCC said.

Companies have tremendous excess capacity for plotting. Therefore, growth can come from new or better equipment, such as the electrostatic plotter, and new uses, such as business graphics, it stated.

BCC estimated that 23,200 xerographic printers will be installed by 1985 — 8,800 with small computers, 6,000 with medium-sized systems and 8,400 with large computers.

By the same year, 4,783 COM recorders, 4,135 COM processors and 6,780 COM duplicators will be in use.

The largest base, however, will be plotters, with 1,689 flatbed plotters and 24,000 drum and electrostatic plotters installed by 1985.

A complete report is available from BCC at P.O. Box 2070C, 9 Viaduct Road, Stamford, Conn. 06906.

Expansions

Dataflux Corp. will move to 1050 Stewart Drive, Sunnyvale, Calif., where new facilities will provide a 50% increase in manufacturing and office space.

Pertec Computer Corp. will begin production at a 100,000 sq-ft manufacturing and support group facility in Chatsworth, Calif. The facility will accommodate all of Pertec's hard disk product line under one roof.

Digital Equipment Corp. has announced an agreement with the city of Boston to be the first tenant in the new CrossTown Industrial Park in the South End and Roxbury. DEC will occupy a 50,000 sq-ft facility.

Perkin-Elmer Data Systems' Terminals Division has doubled the size of its production facilities in Randolph, N.J.

Interactive Data Corp. of Waltham, Mass., has opened a 32,000 sq-ft computer center, doubling its time-sharing capacity.

Data General Corp. will add a 128,000 sq-ft plant to its Westbrook, Maine, facility.

General DataComm Industries, Inc. has purchased a manufacturing and headquarters facility in Danbury, Conn., including a 150,000 sq-ft complex.

Univac has purchased a 40-acre tract in the Oakmead Business and Industrial Park, Santa Clara, Calif., where it plans to build a development and manufacturing center. The initial phase will be a 400,000 sq-ft complex.

Persci, Inc. has moved its operations from Marina del Ray, Calif., to larger facilities at 12210 Nebraska Ave. in West Los Angeles.

MINICOMPUTER DEVELOPMENT

you can see the stars in Wichita

and grow a great career with NCR

We know you couldn't match our one-two combination offer anywhere else in the United States.

In Wichita, you and your family will enjoy the clean air, water, and general peacefulness of our modern municipality. Without giving up the advantages of urban life, you can gain safe streets, good schools, and the time to enjoy the "good life" however you define it. Our location offers opportunities for higher education, 52 parks, and the charm and hospitality of the Oldwest.

Professionally speaking, we offer state-of-the-art challenge in realtime architecture, developing network design and communication control for distributive processing in a revolutionary data processing minicomputer environment. Some of our opportunities are:

COMPILER DESIGN PROGRAMMERS
Serve as a team member for design development documentation testing and enhancing of large compilers.

OPERATING SYSTEMS
Senior level Analyst with minimum of 6 years experience in minicomputer based interactive systems development. Responsibilities will include system architecture for an interactive system currently under development as well as being a major contributor to system enhancement for other development projects.

PERFORMANCE ANALYST
Systems Analyst experienced in performance testing and evaluation. Develop testing procedures to evaluate a minicomputer/based interactive system and apply the results to future development.

You're planning to move up, if you're the kind of professional it takes to join NCR. Why not move in to a friendly atmosphere, where your neighbors will welcome you and your career can expand? We offer both. We'd like to tell you about it in the personal interview, at your convenience, either by phone, or in person.

We welcome your inquiry.

Call us at 316-687-6192, or send us a resume for more details: Mr. Jerry Long, Professional Placement Office, Dept. CW-926, 3718 North Rock Road, Wichita, Kansas 67226.

NCR
Complete Computer Systems

An Equal Opportunity Employer M/F

Argonaut Systems:

Where low cost is part of our high efficiency software package.

At Argonaut Systems we know that good packaged software requires real craftsmanship. We set high standards to make our modular software really work.

You pay one moderate price and that's it. We are available to explain and maintain your software. Or to modify for your system. But there's no need for a team of experts and unforeseen consultation costs. That's the software security we offer at Argonaut Systems.

Well written, solidly crafted programs. If tax laws change, our Payroll/Personnel System is easily updated. An accounts payable package that you can tailor to your operation. And a Taxbreak/Taxcost package that doesn't break the bank.

Quality software modules at a low cost...that's what we call efficiency.
From ARGONAUT SYSTEMS

argonaut
Information Systems, Inc.

2140 Shattuck Avenue, Suite 205
Berkeley, California 94704
(415) 845-7991

Please send more information

Name_____
Company_____
Address_____
City_____ State_____ Zip_____

Attend the Chicago Personal Computing Show™ October 27-29 at the World's Largest Holiday Inn near O'HARE Airport.

See the New Affordable Computers

Now's your chance to see the new low-cost computers you've been reading and hearing about. On display at the Chicago Personal Computing Show will be new computers for your home, professional, business or education use.

For example, Radio Shack will unveil its new $598 complete computer with typewriter keyboard, memory, cassette recorder, video screen and programming. Is it everything that people in the electronics industry are saying it is? You can see for yourself in Chicago. Or how about the Commodore PET? At $595 this computer was the first to be aimed at the mass consumer market. How about the Apple Computer? Digital Group? What new business applications have been developed for the Altair computer and how does it compare with the minicomputers from Wang or Data General?

Literally hundreds of personal computers and related equipment will be up and running for your own, personal hands on inspection. You'll see the latest in inexpensive line printers, floppy disks, video terminals, memory boards and cassette interfaces. You'll also see the latest programmable home video games, many of which are evolving into true home computers.

You can learn from the experts what the computer revolution is all about. See all the new applications for these wonderful machines, compare price and decide what kind of computer would be best for your own use. Attend one of the many free or paid seminars. There's even a computer school where you can learn how to program while actually using a personal computer.

A personal computer can be your equalizer in a complicated world. Come to Chicago and learn what this new product, which could outsell handheld calculators, is all about.

Over 10,000 people and hundreds of exhibits are expected for this big, three day event. Admission: $10 at the door or $15 for all three days.

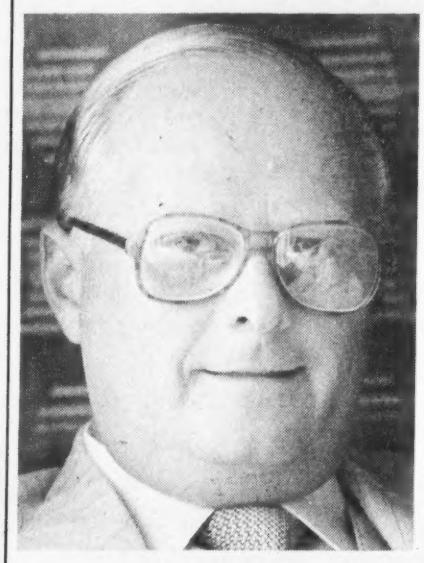
For $1 discount coupon or more information write:
PERSONAL COMPUTING SHOW, 401 Louisiana SE, Suite "G" Albuquerque, NM 87108.

Removal of DP Duties Seen Boost to Canada

By Molly Upton
CW Staff

TORONTO — The removal of duty on computers by the Canadian government would give the industry here a real shot in the arm, according to Richard J. Ball, vice-president and general manager of Honeywell Information Systems, Canada.

On the average, a Canadian user pays 18% more for (imported) DP equipment than the U.S. user, he indicated. That's one reason why the small business market is not larger, he added.



Richard J. Ball

Ball said he thinks the government will remove the duty on DP products, thereby following a recommendation made three months ago by the nation's tariff board.

Rather than implementing a hardware manufacturing operation in Canada, HIS is concentrating on software and has several agreements with the University of Waterloo for software creation.

"Hardware manufacturing isn't a good charter for Canada because it is rapidly becoming low in labor intensity," he remarked.

Job Creation Emphasis

The emphasis in Canada is on job creation, he indicated, adding the government has become more interested in software development than hardware manufacturing in the past two years.

HIS Canada had its best year in history in both volume and profit in 1976 and at the recent end of the first half was 14% ahead of the 1976 period in volume, he said.

The Canadian market is about 10% of that in the U.S. but the complexion of the market is different, he added.

For example, 65% of the total industry revenues come from large-scale machines, compared with 45% to 48% in the U.S., Ball observed. Thus, the emphasis is on large-scale network-type systems, he said.

The figure for large-scale devices also includes related terminals and minis, but so far there are relatively few minis hooked into the large-scale systems, he indicated.

Much of Canadian business is based in one head office with branch plants scattered across the country, and banks are spread out coast to coast, he added.

For example, large banks have from 500 to 2,000 branches, so HIS Canada ran into the demand for large conventional network requirements as early as 1971, he said.

The next step is distributed networks, he added.

Buoyant Industry

Although the Canadian economy is down, with unemployment at 8.1% and the Candian dollar 93 cents on the U.S. dollar, the computer industry has been relatively buoyant, Ball said.

The industries aiding automation traditionally do better when the economy is down, he added.

However, he expressed concern that the Candian economy does not seem to be following its usual path of being 18 months behind the U.S. economy. It should be tracking upwards by now, he observed.

The economy in Ontario is pretty good, with 60% of the gross national product within 150 miles of Toronto, he noted.

Quebec accounts for 33% of the Canadian market and 35% of HIS' market, but Ball sees a lot of hesitancy there because of the bilingual issue. Many firms are reluctant to pour more investment into Quebec, he said.

Not only does HIS have a staffing problem in Quebec because of the languae requirements, but products such as GCOS operate in English and therefore are meeting reluctance. "You'd have to reinvent the product." he said. adding many other non-English-speaking parts of the world have accepted GCOS.

Foreign Orders & Installations

Computer Analysts and Programmers Ltd. of the United Kingdom has ordered an IBM Series/1 system.

Dai-ei Co., Ltd., a department store chain headquartered in Suita City, Osaka, Japan, has ordered a Honeywell Model 66/05 large-scale system.

Kaiser Resources Ltd. of Sparwood, British Columbia, a coal mining company, has ordered a Honeywell Model 66/05 large-scale system.

The Computer Communications Group of the TransCanada Telephone System has selected NCR Canada Ltd. to supply network interface machines for the Datapac network.

The Legal and General Assurance Society Ltd., an Australian insurance firm, has installed two NCR Criterion systems to help accommodate its growing volume of business.

Sky Line Cable Vision of Ottawa has ordered a Reality system from Microdata Corp.

Hacetepe University in Ankara, Turkey, has ordered a B6800 system from Burroughs Corp. to be installed in the new Beytepe campus now under construction.

Caja Rural Provincial de Huelva, a local savings bank in Huelva, Spain, has ordered a Univac 90/30 system.

Asian DP Has Healthy Year

By Toni Wiseman
CW Staff

HONG KONG — This has been a landmark year for computing in Asia, with sales, installations and legislation all adding to the general air of well-being.

Hitachi Ltd., the second largest local computer manufacturer in Japan, signed an $8.5 million contract to supply three large computers to China — two Hitac M160 Series II and a Hitac M170, according to the *Asian Computer Yearbook*. The computers will be used for weather forecasting and are scheduled for delivery early in 1978 to the Central Meteorological Bureau.

The sale, however, is still subject to approval by the Coordinating Committee for Trade of Strategic Goods with Communist Countries (Cocom), an agency of the Organization for Economic Cooperation and Development (OECD).

Meanwhile, communist bankers in Hong Kong are expected to decide this year on a computer system for 13 Peking-controlled banks in the British territory, the yearbook said.

"The People's Bank of China, with more than 500 branches throughout China, has been studying computerization for some time but has yet to make a move.

"Some members of the banking and computer communities believe banking authorities in Peking will use the installation in their Hong Kong banks as an experiment before deciding on a computer system for mainland banks," the yearbook suggested, noting that Control Data, IBM, Univac and NCR are thought to have the best chances of landing the contract.

While the banks are studying proposals, the Royal Hong Kong Jockey Club has made the largest computer purchase in Southeast Asia in recent years, selecting a system based on Digital Equipment Corp. hardware for its extensive betting system.

The system due to be installed for the opening of he club's new racetrack in October 1978, will be based on 14 PDP 11/70s and 11/05s and will have 600 terminals, located both on-course and in the club's off-course betting shops, the yearbook said.

"The system will be capable of handling 250 transactions a second, sufficient to accommodate the frenzied betting that takes place on horse racing in Hong Kong," it added.

Singapore's computer industry came of age in 1976 with SEARCC 76, the first Southeast Asian regional computer conference, organized by the Singapore Computer Society.

"There have been estimates that Singapore, like Hong Kong and other countries in the region, is currently running about seven or eight years behind developed countries in the West, but such estimates are challenged by some industry leaders who put he figure at closer to three years," the yearbook stated.

"Many people are confident Singapore eventually will emerge as the leading center for data processing in the South East Asian region, a position currently held by Hong Kong," it added.

India Delays Growth

Computer development in India is being carefully regulated by the government, with the twin aims of preventing a drain on foreign currency reserves and avoiding any loss of jobs, the yearbook indicated.

"The government has a policy of discouraging the use of computers for routine commercial functions, and it has placed an embargo on the import of hardware for such purposes," it said.

There are currently about 300 computers in India, with IBM having the largest share of the market. IBM was given notice early in 1976 that it must accept a local partner or be closed down, an ultimatum that IBM clearly found unsatisfactory, the yearbook noted.

"The Indian government's policy, expressed through the Electronics Commission, is to eliminate the import of minicomputers and to limit sales to locally produced units," it stated.

Finally, on the legislative front, the Hong Kong Computer Society has concluded a comprehensive investigation into the question of privacy and DP, resulting in a recommendation for legislation to protect individual privacy against the misuse of information stored in computer files.

"It has become clear . . . that reliance on such influences as professional codes of conduct to secure the basic human right of privacy will be misplaced. Legislation is the only answer, and has been found to be the only answer elsewhere," the Society said in its official viewpoint.

The Asian Computer Yearbook is available from Room 302, Ivy House, 20 Wyndham St., Central, Hong Kong.

International News

Canadian DP Arena Detailed

OTTAWA — As of May 1, 1976 the installed base of computers in Canada renting for more than $1,000/mo totaled 5,937, according to a census taken by the Canadian Information Processing Society (Cips).

IBM had the largest market share with 1,645 systems, followed by Digital Equipment Corp. with 985, Honeywell with 532, NCR Canada with 448 and Univac with 402.

By province or territory, Ontario has the largest installed base, 2,714 systems, followed by Quebec with 1,350 and British Columbia with 621.

Almost half the sytems, 2,314, rent for $1,000 — to $1,999/mo. There are 1,924 systems renting for $2,000 to $4,999/mo and only 240 rent for $50,000 or more, Cips found.

Manufacturing is the largest user, accounting for 1,332 systems. Distribution (wholesale/retail) accounts for 714 computers while government uses 690 computers and service bureaus 586.

A complete census is available for $50 from Cips, Suite 214, 212 King Street West, Toronto, Ontario, M5H 1K5.

DECwriter II	DECwriter III
LA36 PRINTER TERMINAL 10-15-30 CHARACTERS SECOND REMOTE OR CONSOLE USE 132 PRINT POSITIONS **$1,645 each**	**LS120 TELEPRINTER** PRINTS 180 CHARACTERS SECOND 300, 1200 AND UP TO 9600 BAUD INCLUDES KEYBOARD, EIA INTERFACE, SELF-TEST MODE AND OTHER FEATURES **$3,295 each**
DECscope	**DECprinter I**
VIDEO DISPLAY TERMINAL MODEL VT52 24 LINES 80 CHARACTERS NUMERIC PAD • HOLD SCREEN MODE SPECIAL FEATURES **$1,795 each**	**LA180 HIGH-SPEED PRINTER** 180 CHARACTERS SECOND 132 PRINT POSITIONS INTERFACES AVAILABLE **$2,695 each**

100% EQUITY RENTAL PLAN

	12 MONTHS	24 MONTHS
DECwriter II	$150 month	$ 83 month
DECwriter III	300 month	165 month
VT52 DECscope	165 month	90 month
DECprinter I	250 month	135 month

FULL OWNERSHIP AFTER 12 OR 24 MONTHS

OPTIONAL FEATURES INSTALLED WITHOUT CHARGE
QUANTITY DISCOUNTS, LEASE AND RENTAL PLANS
WE ALSO MARKET MODEMS, ACOUSTIC COUPLERS
AND DIGITAL CASSETTE UNITS

TRANSNET CORPORATION
2005 ROUTE 22, UNION, N.J. 07083
201-688-7800

DEALERS...AJ WANTS YOU

Anderson Jacobson, a leading manufacturer of data communications products, would like to introduce you to our new minicomputer, the AJ System 1500. And we need your expertise to make our small business system successful.

Here's what we have to offer:

- Good margins
- Exclusive territories
- A small business nucleus of application software at *no charge* to you
- Excellent client accounting software, also at *no charge*
- A multi-programming, multi-terminal system that is *fully* expandable
- AJ field service available in selected areas of the United States
- Floppy or hard disk systems

If your are interested in being a part or AJ's successful future, call or write Bob Reed, National Marketing Manager, for more information.

Computer Systems Division

ANDERSON JACOBSON

Anderson Jacobson Inc., 521 Charcot Avenue
San Jose, California 95131 • (408) 263-8520

Pertec: Plug-Compatible Floppies Developing

BOSTON — The flexible disk drive will be thought of more and more as a component by system designers.

And, in response, disk drive suppliers will strive for plug compatibility among competitive products, J. David Callan, vice-president and general manager of Pertec Computer Corp.'s Microsystems Division, told the Invitational Computer Conference here recently.

As an example, Callan pointed to Pertec's recent introduction of its FD200 Microfloppy disk drive for 5-1/4-in. diskettes, which is mechanically and functionally interchangeable with the Shugart SA400 introduced earlier.

"Performance and features differ," Callan said. "The FD200, for example, permits writing on 40 tracks vs. 35 for the SA400. But the signal interfaces are compatible and mounting holes and outline dimensions are the same.

"With two independent suppliers of floppy disks offering plug-compatible units, there will be a strong incentive for other manufacturers to follow suit," he stated.

The result of the trend toward plug compatibility will be that OEM system manufacturers can be much more comfortable about the availability of second-source suppliers and the ease of upgrading as new products are introduced, he explained.

Capacity Doubling

Callan also noted that the capacity of floppy disks has been doubling at two-year intervals — a growth rate that, coincidentally, parallels the increase in density of LSI memory chips.

"The doubling of storage capacity has come about through the successive introduction of double-sided recording and double-density coding schemes in floppy disk drives," Callan said. "The next jump in capacity is likely to come from double-track recording, which seems to be just about two years away."

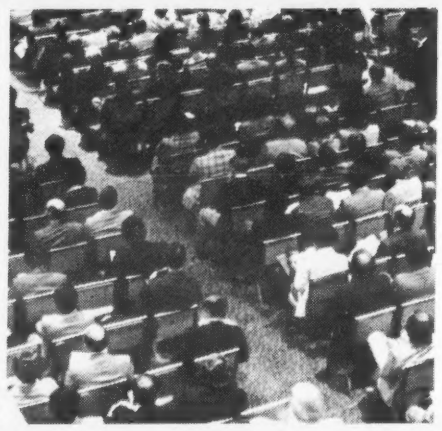
Manufacturers are working on write precompensation schemes in the disk controller to implement double-track recording, Callan said. In addition, media improvements may become available to overcome some of the stability limitations of current mylar flexible disks.

Either of these developments, or a combination of the two, is likely to make double-track recording and the resultant doubling of disk capacity available to users within the two-year span, he said.

As for pricing trends, Callan said a round of competitive price cutting is likely to be over, and floppy disk prices will probably stabilize for some time to come.

He does, however, foresee the user benefiting in the near future from improved performance and added features without a significant cost increase. This will be achieved through improvements in the drive and through the availability of new LSI controller chips now being developed by semiconductor companies, Callan said.

DataComm 78
Conference & Exposition
Washington, D.C.
Feb. 21-23, 1978



The ONLY National Industry Show Scheduled For An East Coast City In 1978

Extraordinary buying power will be represented at DataComm 78 because of its prime location, Washington, D.C. The Conference and Exposition takes place in the heart of the concentrated computer population in the Northeast and Northcentral parts of the country.

Almost 40% of the total installed value of general-purpose computer systems in the entire U.S. is within a 400 mile radius of DataComm 78. . .Sites within that area account for approximately 1/3 of all U.S. data processing expenditures. Users in this key geographic area find DataComm not only essential to attend, but also within easy reach.

Organizers of the annual DataComm Conference and Exposition have taken full advantage of the Washington, D.C. site to present special sessions on government involvement in data communications.

DataComm's 1978 Conference Program is nearing completion with well over 100 speakers, more than 1/2 representing vendor companies. . .all the way from AT&T to Xerox. That's good company. . .it means business! For them and for you.

The expanded program for this year's DataComm, coupled with the show's traditional appeal to all levels of interest in the data communications marketplace, is designed to attract an even greater number of attendees than in the past.

Excellent booth locations are still available. . .to reserve your space NOW, return this coupon immediately.

DataComm 78
Conference & Exposition
Washington, D.C.
Feb. 21-23, 1978

To: CONFERENCE CHAIRMAN
DataComm 78
60 Austin Street
Newton, MA 02160

Here's what I want from DataComm 78:

☐ All the Logistics: price, floor plan, reservation agreement
☐ To talk to a DataComm representative
☐ The monthly newsletter, "DataComments"

Name _____
Title _____
Company _____
Address _____
City _____
State _____ Zip _____
Telephone _____

Executive Corner

• Donald L. Gross has been elected chairman of the board and William R. Doniger has ben named president and chief executive officer of Mini-Computer Systems, Inc.

• Richard L. McCall, president of U.S. Datacorp, has been named to the Trade Member Council of the National Micrographics Association.

• Ronald E. Vance has become vice-president of Anacomp, Inc.

• William R. Kaseta has been appointed director of sales and marketing at Information Access Systems.

• James MacKenzie has joined Data Terminal Systems as director of marketing.

• Jesse W. Caravello, Martin Hoffman, Paul L. Jones, Michael E.McCorry and Donald J. Walker have been named vice-presidents of Comshare, Inc. They will head operations, research and development, financial product services, Western sales and Eastern sales, respectively.

• John E. Fox has become vice-president for marketing and Robert J. Perry has been appointed vice-president for plans and controls at Satellite Business Systems.

• Clyde J. Cook and William S. Ringler have been promoted to senior vice-presidents, and W. Chuck Kruger and Dennis Self have become vice-presidents of Central Computer Services, Inc.

• Richard L. Seaberg has been named vice-president and general manager and Wilfred D. Geiger has been appointed director of business planning for Univac's Defense Systems Division.

• Robert E. Didion has become division vice-president for operations and Bob C. Barron has been promoted to vice-president for industrial relations and administration at Pertec Computer Corp.

• Ronald G. Gilch has been appointed director of the business development department of Aspen Systems Corp., a subsidiary of American Can Co.

• John Russell has been named manager of marketing programs at Bowne Time Sharing.

• John Puchon has been appointed director of systems development for Decision Data Computer Corp.

• Fred J. Gentile has been appointed vice-president for development at Action Communications Systems.

POSITION ANNOUNCEMENTS

SYSTEMS PROGRAMMER
PROGRAMMER ANALYSTS (3)

- **SYSTEMS PROGRAMMER**

minimum 1 year experience with IBM 360/370, ALC, systems generation. VM/370, VS/1, teleprocessing, and minicomputer experience helpful. College degree preferred. 18-20K

- **PROGRAMMER ANALYSTS**

1-2 years COBOL programming essential. Familiarity with PL/1 and/or MUMPS helpful. Experience in a University environment preferred. College degree preferred. 12-15K.

We offer challenging positions in a progressive DP department using VM/370, CMS, and VS/1 on an IBM 148. Also, DEC PDP 11/45, 11/10 under Mumps. Fringe benefits include free tuition program. Forward resume, including current salary to

Ines Kerch, Administrative Officer
Georgetown University
Ryan Administration Bldg., Washington, D.C. 20057
EEOC/Affirmative Action Employer

COMPUTING PROFESSIONALS

ARE YOU A RESULTS ORIENTED TECHNICAL TEAM PLAYER? Do you take pride in what you do as an individual, but also appreciate the satisfaction of working closely with highly competent technical colleagues? Do you want the visibility and the rewards that go with full utilization of your skills?

Consider COMSHARE. We are looking for people who know they are better, are willing to prove their value, and can deal with success. We have the following senior level openings:

TECHNICAL PROGRAM MANAGER
B.S., M.S. or M.B.A. and five plus years experience in software/hardware development line management or product/program management functions.

INDUSTRY ANALYST
B.S., M.S., or Ph.D. with at least five years experience in the data processing industry. Ability to evaluate systems configurations, functionality content, and performance characteristics of computer vendors and competitor computer service companies.

COMPUTER SYSTEM ENGINEER
B.S. or M.S. in Electrical Engineering or Computer Science and five or more years in designing and developing computer systems related hardware. Some software understanding and skills are required.

COMMUNICATIONS/NETWORKS PROGRAMMERS
B.S. degree or equivalent and at least two years experience in programming teleprocessing systems, preferably on minicomputers.

SYSTEMS PROGRAMMERS
B.S. degree or equivalent and at least two years experience in developing operating system software internals.

COMSHARE is a rapidly growing international computer services company headquartered in Ann Arbor, Michigan, Research Center of the Midwest. These positions command excellent salaries and fringe benefits. And by the way, our people think we're a fun place to work.

Please send your resume to:

Marty Hoffmann
Vice President, Research and Development
COMSHARE, INCORPORATED
P.O. Box 1588, Ann Arbor, Michigan 48106

An equal opportunity employer

COMSHARE

Take this Opportunity to Talk Informally about Upgrading Yourself.

You may not be actively looking for a new position. But you recognize that your ability to grow—both professionally and personally—is constrained by a variety of factors in your present environment. Maybe you've reached an endless plateau. Maybe you've become too far removed from leading-edge state-of-the-art hardware or software. Or, perhaps you feel lost on a slow track in a large, highly structured organization.

You have probably been following Amdahl's progress and have come to respect the company's technical, marketing and support capabilities. You may even know someone from Amdahl, and you are somewhat envious of his or her professional freedom and opportunities for advancement. And you may already be impressed with the enthusiasm and spirit of the challenge that seems to touch everyone at Amdahl.

There is still room on the ground floor at Amdahl. We are actively looking for candidates to fill the local positions in this advertisement. (We also have available openings on our headquarters support staff in California.) Please call 415/735-4308 (collect) for an advance appointment to talk in one of the cities shown below; ask for Phil Beckhelm. Amdahl Corporation, 1250 East Arques Avenue, Sunnyvale, California 94086. We are, of course, an equal opportunity employer.

LOCAL INTERVIEWS FOR LOCAL AREA POSITIONS

Call Phil Beckhelm at 415/735-4308 (collect) for advance appointment, or contact him locally at the indicated hotel.

WASHINGTON, D.C.	NEW YORK CITY	DETROIT	MINNEAPOLIS
Capitol Hilton	New York Hilton	Sheraton Southfield	The Registry Hotel
Thurs., Fri., Sat.	Sun., Mon., Tues.	Thurs., Fri., Sat.	Sun., Mon., Tues.
Oct. 6, 7 & 8	Oct. 9, 10 & 11	Oct. 13, 14 & 15	Oct. 16, 17 & 18

FIELD SYSTEMS ENGINEERS

You will provide first-level systems software support at Amdahl 470 installations, assisting the center in maintaining systems software both within and without the Amdahl supported systems. You have large systems software experience with one or more of the following SCPs or program products: MVS, VM, SVS, VS1, ASP, JES2, JES3 or CSCP. You know internals and have defined and tuned SCPs. You also have exceptional diagnostic abilities, and are familiar with large systems hardware and peripherals as they interrelate with IBM compatible software. You have the personal skills to assume account management responsibilities.

FIELD ENGINEERS

You will provide first-level hardware support at Amdahl 470 installations, utilizing your initiative as well as your talents in aiding the center in overcoming all hardware problems regardless of their origin within the center. You will troubleshoot CPU and memory units, and act in an advisory capacity on non-Amdahl peripherals. In addition to performing all types of maintenance on 470s, you will coordinate Amdahl headquarters support staff in making installations. You have several years' large systems experience (preferably 370/158-168), or have worked as a peripherals field engineer in a large-system environment. You will enjoy some travel.

REGIONAL FIELD SYSTEMS ENGINEERS

You are a well-seasoned, large-scale systems programmer with the experience or aptitude for supervision and marketing support. You will perform survey and analysis work at prospective installations, provide technical assistance in proposal generation, and participate in marketing presentations. You will also be a strategy advisor to field systems engineers, aid in recruiting regional support personnel, make field support recommendations to headquarters, and bring your talent to bear on the more elusive software maintenance problems. The most immediate openings exist in Washington, D.C. and Detroit.

COMPUTER SYSTEMS SALES REPRESENTATIVE

You are the right candidate for this opportunity if you do not *have* to make a move; if you are currently leading your peers in competence, enthusiasm and performance, and if you have a need to be on a winning team selling the better product. You will have a thorough knowledge of the large-scale computer marketplace, and a five-year performance record. You will enjoy the personal and professional satisfaction of selling the proven price-performance leader, and enthusiastically relating the Amdahl success story to a wide audience that is anxious to hear the details. The most immediate opening is in our Eastern Division.

amdahl

1

ADVANCED TECHNICAL DIVERSIFICATION

2

PROFESSIONAL GROWTH

3

OUTSTANDING CAREER PACKAGE

Engineers — Software Design

3 Reasons Why You Should Look Into the Career Opportunities at GTE Automatic Electric!

Career challenge: the opportunity to make significant contributions at the beginning of a new era in a major industry.

The technical evolution in telecommunications is underway. We're working in many areas of software design in an on-line, real-time environment. Definition, design and implementation projects include CAD, Data Base Systems, Simulation, Fault Recovery, Diagnostics, and very complex switching networks using distributed control system technology. These are the forerunners of even more advanced systems that will be designed for the next generation.

SOFTWARE DESIGN

We're looking for an indepth background in the development of systems software and a minimum of 3 years' experience in structured design, testing and documentation of programs running on large data base, multi-file systems in real-time. Familiarity with HIPO design documentation, TSO usage and software simulation techniques as well as PL1, Fortran and assembler languages for the 8080 and PDP 11 programming is also important.

DATA BASE DESIGN

This position requires a minimum of 5 years' experience in the planning development, design and implementation of data base software, including data base management systems administration. Your primary responsibilities will be the development of data base system for a large on-going project including the implementation, support and administration of systems.

COMPUTER AIDED DESIGN

We are looking for an extensive background in the design of CAD/CAM systems and the development of Interactive access by the users of CAD/CAM functions. Required is 5-10 years' experience in both hardware and software aspects; DA systems operations, and design, and systems engineering. Your initial responsibilities will include evaluation of existing systems, and working with a project team in the Architectural Planning of a major new system.

MINI-COMPUTER PROGRAMMERS

We have specific assignments available on project development teams responsible for the design implementation of various telecommunication processing systems utilizing mini-computers as the processing element. Responsibilities will include the development of software programs for real-time operating systems as well as unique hardware elements incorporated into the systems.

Call now and let us fill-in more details. . .

CALL (800) 323-1966

In Illinois call (800) 942-0491
Sunday thru Friday, from 8 am to 4 pm cdt

If you have current experience in one of these areas, a BS, MS or PhD in Electrical Engineering, Computer Sciences, Math, or other appropriate discipline, let us count out more of the benefits and challenges you receive as a member of the GTE family.

If unable to call, please send your resume to:
Manager of Technical Employment, Dept. 471 A6

GTE AUTOMATIC ELECTRIC LABORATORIES
400 N. Wolf Road
Northlake, Ill. 60164

An Equal Opportunity Employer M/F

Field Engineering Specialists

Amdahl Corporation has earned an international reputation as builder of the most advanced large computer system. Since our first shipment two years ago, we have delivered a quarter of a billion dollars worth of computers to the world's major companies and institutions. The company is exciting, the environment stimulating, and our compensation and benefits are excellent.

We seek Field Engineering Specialists who have a minimum of 5 years' experience in maintaining large-scale systems with in-depth training on compatible CPUs. You will have company support in assisting the Amdahl customer in his mixed-vendor environment to maintain full operations in his center. You will have the opportunity to work with multiple customers, to guide and support field engineers and to use your technical expertise for your own personal development and the growth of the Amdahl Corporation. Openings exist at Amdahl headquarters in California and temporary assignments are available in the Far East with a permanent assignment following. Please indicate 580-E on your response and direct it to Employment Manager, Amdahl Corporation, 1250 East Arques Avenue, Sunnyvale, CA 94086. We are, of course, an equal opportunity employer.

amdahl

COMPUTER SYSTEMS SPECIALISTS
(DISTRIBUTED PROCESSING)

IT PAYS TO JOIN THE LEADER!

General Electric is the world leader in information services—time sharing, remote batch processing, networking. Now we're looking for aggressive Systems Specialists to help us grow in the area of distributed processing.

Major responsibilities for this position will include design and implementation of the software for an Intelligent Terminal Cluster in conjunction with our major time sharing network service. This includes assisting in the design of a Cluster Controller software system; implementation and coding of Cluster software; checkout of the implemented system; and software maintenance of the developed product.

Applicants must have programming skills in assembler languages, including at least four years experience with mini-computers and/or micro-processors, and experience in the design of data base and file structures for small size media such as floppy disks and cartridge disks. In addition, experience/knowledge in using and programming Intelligent Terminals (Datapoint, Sycor, Texas Instruments, Four Phase); distributed processing and distributed data bases; and communications protocols such as BYSNC, GRTS, SDLC, and X-25 is desired.

Send your resume, salary history and requirements in confidence to: J. Calhoun, Employment Manager, General Electric Company, Information Services Division, 401 N. Washington St., Rockville, Md. 20850.
An Equal Opportunity Employer M/F.

GENERAL ELECTRIC

THE SEARCH IS ON

For The Top Sales & Support People In The Computer Industry.

Marketing and Services Information Systems Division (MSISD)

has embarked on a major expansion program, sparked by both the outstanding success of our current state-of-the-art hardware and software systems and the promising new mini, small, medium and large computer systems going into production shortly. Honeywell MSISD is exploding throughout the country and seeks qualified professionals at all levels of experience to join them in the exciting computer future. Honeywell will be a major factor in this future. Talk to us and we will give you the hows and the whys as well as the whats about your future.

Hardware Marketing Representatives

Career and growth opportunities exist for sales/marketing representatives with experience in one or more of the following areas: LARGE SYSTEMS, MEDIUM SYSTEMS, SMALL SYSTEMS, MINI SYSTEMS AND PERIPHERALS. It will be your responsibility to develop and cultivate prospective clients and to ensure that all Honeywell marketing and service functions are coordinated to offer the most effective presentation of the company product lines. Expansion openings exist in major cities coast-to-coast.

Systems Representatives

This extremely important function involves planning, designing, developing and implementing systems applications and/or modifications to meet specific customer or prospective customer requirements. Career openings exist at all levels of experience from entry level with college degree or equivalent and at least one year programming background. Experience with languages such as: Fortran, Cobol, RPG-II, PL1 and Operating Systems, GCOS, and GMAP is desirable.

Field Engineering Representatives

At Honeywell, we seek Field Engineering Representatives to maintain and service computer systems and/or peripherals. You should have 2 years technical training or equivalent military/industrial electronics experience.

Please forward your resume or the coupon to one of the following appropriate individuals:

HEADQUARTERS
J.W. White
Honeywell
MSY- 202B
200 Smith Street MS/425
Waltham, MA 02154

SOUTHERN
J.L. McGuire
Honeywell
MSY- 202B
6 West Druid Hills Dr. NE
Atlanta, GA 30329

CENTRAL
R.A. Moore
Honeywell
MSY- 202B
4849 North Scott Street
Schiller Park, IL 60176

EASTERN
R.L. Potter
Honeywell
MSY- 202B
300 East 42nd Street
New York, NY 10017

WESTERN
R.J. Beaugrand
Honeywell
MSY- 202B
5959 West Century Blvd.
Los Angeles, CA 90045

FEDERAL SYSTEMS
G.W. Hess
Honeywell
MSY- 202B
7900 Westpark Drive
McLean, Virginia 22101

Openings exist throughout the United States including, but not limited to the following locations: SOUTHERN: — Atlanta, Birmingham, New Orleans, Tampa, Orlando, Miami, Richmond, Norfolk, Roanoke, Dallas, Houston, Greensboro, Charlotte, Greenville, San Juan, McLean, and Baltimore — CENTRAL — Milwaukee, Madison, Springfield, Peoria, Omaha, Kansas City, Mo., Toledo, Cincinnatti, Columbus, Grand Rapids, Louisville, and Indianapolis — EASTERN — New York, Boston, Philadelphia, Pittsburgh, Cleveland, Hartford, and Buffalo — WESTERN — Seattle, San Francisco, Los Angeles, Denver, Phoenix, Portland and Albuquerque — FEDERAL SYSTEMS — Phoenix, Minneapolis, Omaha, Baltimore, Atlantic City, and Washington, D.C. — **HEADQUARTERS** — Boston/Waltham

02A

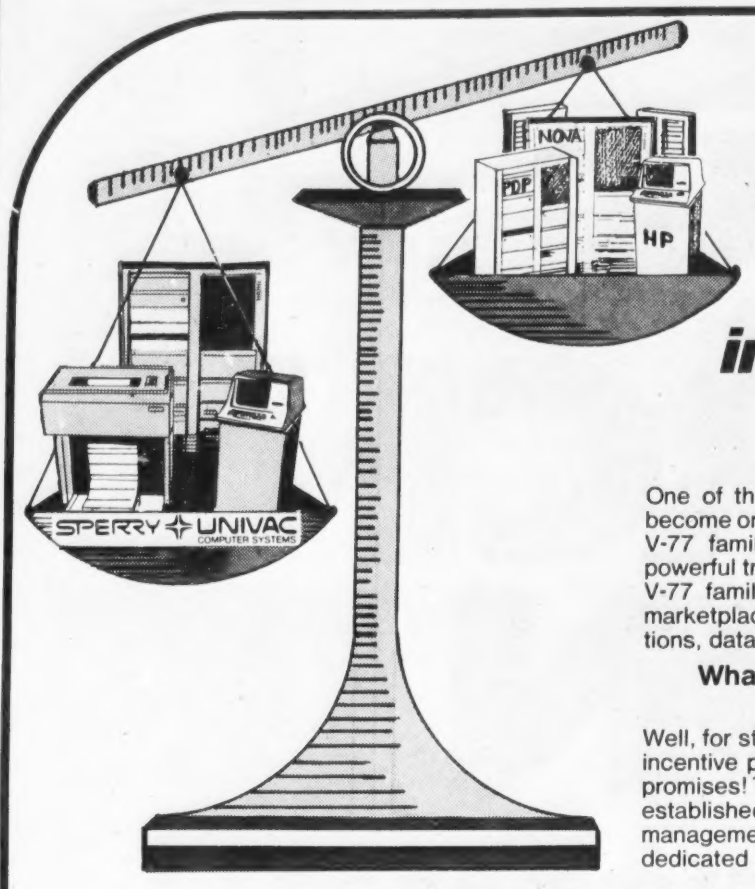
NAME _____
TITLE _____
ADDRESS _____
CITY _____ STATE _____ ZIP CODE _____
PHONE _____
AREAS & YEARS OF EXPERIENCE _____
_____
POSITION(S) OF INTEREST _____
_____

THE SEARCH IS ON

An Equal Opportunity Employer M/F

Honeywell

position announcements | position announcements | position announcements | position announcements | position announcements



sales engineers

The odds are in your favor with Sperry Univac!

One of the biggest names in big computers has recently become one of the biggest names in small computers with the V-77 family of high performance mini-computers, a fast, powerful trio that relate to most mainframes. Specifically, the V-77 family is directed to applications in the commercial marketplace and include process control, data communications, data base and distributed processing systems.

What can Sperry Univac offer you that DEC, Data General, HP or GA can't?

Well, for starters, we feel we have one of the industry's best incentive plans, and second, real career opportunities - not promises! The goal to double in size within the year has been established and this means that both short and long term management opportunities are available for hard working, dedicated professionals.

What do we expect from you?

A minimum of 2 years mini-computer sales experience in the Data Base, Data Communications and/or Distributed Processing marketplace AND technical competence in hardware and software, plus a record as a closer who maintains account relationships and gets new and repeat business.

If you're experienced in selling the Nova, Eclipse, the Naked Mini, PDP's HP or GA's-SPC, the odds are in your favor with Sperry Univac.

For openings in: Chicago, Dayton, Detroit, Philadelphia, New Jersey, New York (Manhattan), Atlanta, Orlando and Washington, D.C. please call Gerry Goerlitz collect at 215/542-5254 or send your resume to B301M, P.O. Box 500, Blue Bell, Pa. 19422.

For openings in Dallas, Houston, Los Angeles, San Francisco or Seattle please call Gary Montgomery, collect at 714/833-2400 or send your resume to 2722 Michelson Drive, Irvine, Ca. 92713.

SPERRY UNIVAC
COMPUTER SYSTEMS

To investigate other openings with Sperry Univac, please direct your resume to P.O. Box C19504, Irvine, Ca. 92713.

An Equal Opportunity Employer M/F

FIELD SERVICE

SYSTEMS	370/360, H-200, XDS, Univac, CDC All Large & Medium CPU's
MINI's	PDP, NOVA, G.A., HP, etc. All Mini Systems
I/O	STC, TELEX, CDC, ITEL, CALCOMP, etc. All Peripheral Experience

MTTR

(312) 547-6682
MTTR ASSOCIATES
1107 Mannheim Road
Westchester, Ill. 60153
$12-30K
Field Service Specialist
Nationwide Placement
Private Employment Agency
No Fees To Applicants

HEAD OF DATA PROCESSING

Mississippi State University is seeking candidates for the position of Head of the Data Processing Department. Position responsibilities include management of data processing activities, coordination with user and computer operations personnel, leadership in systems development and long-range planning, and supervision of approximately 30 employees.

Computer support for data processing is provided on a dual-processor Univac 1108 which also supports education and research.

Applicants must meet the following requirements: bachelor's degree, minimum; managerial, system planning, and programmer/analyst experience in data processing using medium to large computers; demonstrated state-of-the-art knowledge of data processing methodology.

Salary open. Send resume to:

Fred Davis, Director
Div. of Numerical Services
Mississippi State University
P.O. Drawer CC
Mississippi State, MS 39762

MSU is an Affirmative Action/ Equal Opportunity Employer

MANAGER, ADMINISTRATIVE SYSTEMS

Major responsibility for managing and directing the Administrative Systems section at Idaho State University's Computer Service Center. Masters degree or suitable experience in computer science or related field, plus a minimum of four years work experience in computing and information systems, preferably at a university. Resume should include as a minimum, transcripts from post-secondary institutions, employment history and salaries, plus a summary of the applicant's qualifications. Idaho State offers the successful candidate a challenging, state of the art environment including IBM 370 batch and minicomputer-based on-line technologies. Appointment to be effective Nov. 1, 1977. Send resume no later than Oct. 7, 1977 to:

Norman A. Wismer, Director
Computer Service Center
Idaho State University
Pocatello, ID 83209

Affirmative Action
Equal Opportunity Employer

STOP PROGRAMMING

Start Selling IBM Systems Software

Capex Corporation develops and markets systems software for IBM OS, OS/VS, MVS. Due to expanding sales, technical sales positions now exist in Atlanta, Chicago and New Jersey.

Ideal candidates for these positions will have two years COBOL programming experience, good communication skills and a desire to get into sales. You will have management responsibility for a large sales territory and participate in a lucrative commission plan plus salary and fringes.

If you want to apply your technical knowledge in a professional sales career, send your resume to Donald Rosner, Vice President of Marketing, 2613 N. 3rd St., Phoenix, Arizona 85004; (602) 264-7241.

Capex Corporation

an equal opportunity employer M/F

HEY!

Got boss problems?
Company not growing?
No advancement opportunity?
Outdated hardware? All Maintenance and no Development?

Give us a call or send us your resume. We specialize in Data Processing and work coast-to-coast.

Dunhill
Employment Agency
of Roth Worth, Inc.
901 Ridglea Bank Bldg.
Fort Worth, TX 76116
(817) 732-8191

PROGRAMMER ANALYSTS

High visibility positions w/ rapidly expanding Boston based consulting firm. Oppty to install major mfg/fin'l systems in different EDP environments. Min 3 yrs EDP exp w/strong prog bkgd. CICS & data base a plus. Salary to $20,000 (Fee paid). Contact Jim Staunton.

ROBERT HALF
PERSONNEL AGENCIES

140 Federal St.
Boston, MA 02110
617-423-6440

TECHNICAL SALES MARKETING REP

Put NEW Growth in Your Career!

If you are a restless systems engineer now working with an end user with three to five years solid experience with IBM equipment, or if you are already in sales and marketing of IBM or IBM compatible equipment, we may have just the fresh growth opportunity you seek.

Our client, a major subsidiary of a New York Stock Exchange company, offers a ground floor marketing opportunity in their New York City territory to market System 360 and System 370 computer leases as well as provide sales support to existing leasees. $30K including salary and commission.

You will report directly to the corporate VP, Marketing.

Please send your resume and salary history in confidence to:

BOX 3170
COMPUTERWORLD

Representing an Equal Opportunity Employer

SYSTEMS PROGRAMMER

We are a major force in Iowa banking and have a challenging opportunity for an individual capable of filling a key position within our company. The person we seek will be responsible for the generation and performance evaluation of DOS/VS, CICS/VS, and VSAM as well as other related systems software. If you would enjoy having an excellent opportunity to grow and learn, a salary limited only by your ability, a competitive benefit program, a chance to work with the latest IBM hardware and software systems, and the contentment of working in a pleasant midwestern city, please submit your resume to:

Ronald D. Long, AVP
Brenco Automation Center, Inc.
717 Mulberry, Suite 503
Des Moines, IL 50309
A subsidiary of Brenton Banks, Inc.

APPLICATIONS PROGRAMMER

The Purdue University Administrative Data Processing Center has openings for experienced applications programmers. The computer facility is an IBM 370/148 with OS/VS1, CIC/VS, ROSCOE, and RAMIS.

Required Qualifications: Business Applications Programming Experience, ANS COBOL, OS/VS JCL.

Excellent benefit program in the environment of a large university. Please submit resume with references, salary, and work experience to:

Mr. T.L. Haworth
Personnel Services-ADMS
Purdue University
West Lafayette, IN 47907
(317) 749-6256
An Equal Access/
Equal Opportunity Employer

EDP
CAROLINAS

Progr: OS Cobol	$15,000
Prog Anal: CICS	$20,000
Software Support: OS	$23,000
Syst Anal: Mfg.	$25,000

Several positions open in the above catagories. Mail confidential resume or call Joe Sawyer, The EDP Personnel Specialist, (803) 233-2546.

EXCEL PERSONNEL
1421 Laurens Rd., Suite 200A
Greenville, SC 29607

ASSISTANT DIRECTOR SENIOR SYSTEMS PROGRAMMER

The University of Notre Dame seeks a qualified Assistant Director for Hardware/Software Systems and a Senior Systems Programmer. The Computing Center provides services for administrative, instructional and research activities of the University. The major computing environment is a 370/158 operating under MVS with heavy TSO usage. Major areas of growth are expected to be in networking and in on-line update/inquiry of data bases. Applicants should have broad computing experience including 2-5 years of systems programming. Experience in an academic institution and appropriate acaemic credentials are desirable. Salary range is 19-25K for Assistant Director and 15.5-19.5K for Senior Systems Programmer. Send resume, salary history and references to James R. Wruck, Computing Center, Notre Dame, Indiana 46556. Notre Dame is an EO/AA Employer.

Computer Architecture

Our Systems Architecture group seeks talented professionals to help design future high-performance computer systems. You should have a broad educational background in EE or CS with emphasis on computer architecture or design and be familiar with most of these areas: computer systems organization; storage systems organization; operating systems theory; assembler/high-level languages; data base fundamentals. Combined hardware and software experience and familiarity with system 370 is desirable. We have immediate openings for the following positions.

SENIOR SYSTEMS ARCHITECT

You will be a key decision maker on an architectural team. You have experience in either computer systems or operating systems architecture or design.

CONSOLE AND MAINTENANCE ARCHITECT

You will be responsible for the design of system consoles and work on system maintenance strategies. You have experience or aptitude in most of these areas: small and large computer systems; diagnostics; small operating systems and project management.

STORAGE SYSTEMS ARCHITECT

You will be key in defining the architecture of of future storage and data base sub-systems. You have experience in either of these areas.

SOFTWARE SYSTEMS ARCHITECT

You will be a software systems specialist on an architectural team. You have an architectural orientation and experience with operating systems/data base, preferably on system 370.

SYSTEMS ARCHITECT

You will be a member of an architectural team working on diverse investigations. This position offers tremendous educational and advancement opportunities. You have at least 2 years' related experience.

SYSTEM PERFORMANCE ARCHITECT

You will be the performance specialist on an architectural team. You are a qualified professional in computer system performance measurement, evaluation and modeling with emphasis on architecture or design. Research into key areas of new product development will be a major responsibility.

PERFORMANCE MEASUREMENT SPECIALIST

You will be responsible for the development of measurement methodologies to provide the measurement support of future product development. The position requires broad experience and knowledge of computer system operation, measurement methods and system modeling.

WORKLOAD SPECIALIST

You will be responsible for research of computer system workload classification and analysis, including workload creation and synthesis. Research ability in the areas of performance measurement and evaluation is necessary.

We're looking for exceptional talent. You can expect an exceptional compensation and benefits package. Please direct your response to Manager, Professional Employment, Amdahl Corporation, 1250 East Arques Avenue, Sunnyvale, CA 94086. To expedite your application, please indicate 416-E on your resume or letter. We are, of course, an equal opportunity employer.

amdahl

SENIOR SYSTEMS PROGRAMMER

Southern Florida financial institution requires SENIOR SYSTEMS PROGRAMMER with indepth knowledge of NCR 300 and B-4 operating system. Supervise staff of three, provide technical advice and operating standards. All interview and relocation expenses paid.

Send resume and salary requirements. Agencies invited to submit candidates.

CW Box 3169
797 Washington St.
Newton, Mass. 02160
Equal Opportunity Employer

EDP OPPORTUNITIES

Principal Anal-DEC 10/11 other mini OK Spvse 3 to 7 P/L digital applications — $30-35K
Project Ldr-PDP 8/11 communications exp — $28K
Dir of Training-tech & mgmt develop exp essential — $25K
Software Support-HASP Inter JES 2 MVS — $25K
Systems ANAL-D/B CMS — $23K
BAL OS-learn IMS CICS degree — $19.5K
Programmer -ALP OS On line TCS — $19K
Programmer OS 370 Interactive system — $19K
Mgmt Sci-Conn loc or mgt sci degr — $19K

Bill Borrelli (212) 349-3610
William Harris Assoc.
150 B'way agency NY 10038

PROGRAMMER/ANALYST

Newspaper group has an immediate opening for an individual with knowledge of DEC PDP-11 with RSTS operating system. Will be responsible for development, installation and maintenance of business systems in the BASIC PLUS, BASIC PLUS 2 and RPG programming languages at local newspaper sites.

An unusual opportunity for the right individual to advance the state of the art in on-line interactive business applications. Excellent growth potential, competitive salary and fringe benefits. Some travel necessary. All replies will be held in strict confidence. Send resume and salary requirements to:

CW Box 3162
797 Washington St.
Newton, Mass. 02160

position announcements | position announcements | position announcements | position announcements | position announcements

DIGITAL SYSTEMS ENGINEERS.

Career opportunities for Digital Systems Engineers are available with Aramco in Saudi Arabia. Aramco, the world's largest oil producing company, has several multibillion dollar projects under way, and if you're qualified, is willing to pay you well for your talents.

Besides one of the best benefits packages in the industry, you can expect your net take-home pay in Saudi Arabia to be approximately equal to your gross pay in the U.S. Advancement opportunites are excellent.

The job.

You will be responsible for maintaining minicomputer systems used for process control, power dispatching, and other sensor-based applications.

It is required that you be familiar with state-of-the-art design practice for logic circuits such as TTL and CMOS, A/D and D/A converters, core and semiconductor memories, bulk storage devices, and CRT consoles.

You should also have experience in assembly and machine languages, programming and diagnostic fault-finding techniques.

You must be willing and capable of performing hands-on system troubleshooting and maintenance as well as supervising technicians.

You are required to have an engineering degree in an appropriate discipline and a minimum of 5 years' experience in minicomputer systems.

Work schedules.

Successful applicants may be requested to relocate permanently in Saudi Arabia and work a regular work schedule, or work a special "42-21" schedule in which you work 42 consecutive days in Saudi Arabia then have 21 consecutive days off for repatriation to the U.S. with round trip air travel provided. (You would work a 60-hour week with guaranteed overtime pay—something you might not ordinarily get in the States.) Persons working the "42-21" schedule also receive free room and board while in Saudi Arabia.

Other benefits Aramco offers.

Medical care for you and your family is furnished at no charge by the company while you are in Saudi Arabia. On the average of every 12½ months, persons working a regular work schedule will receive 40 days' paid vacation plus round trip air fare to the U.S. for themselves and their families. And to this time off, add another 12 paid holidays each year.

Aramco also offers you good savings and retirement plans. And in addition to your salary, you receive a generous, tax-protected expatriate premium.

Want to know more?

If you're qualified and want more information, write for an application. We will be back in touch with you as soon as possible.

ARAMCO
SERVICES COMPANY

WRITE DEPT. CW0926A, 1100 MILAM BUILDING, HOUSTON, TEXAS 77002

360/370 SYSTEMS PROFESSIONALS

NATIONWIDE POSITIONS
15K-35K
MANAGEMENT
HARDWARE & SOFTWARE
TECHNICAL SUPPORT
Field Service
TRAINING
APPLICATIONS

MATT SARNER ASSOCIATES

10050 N. Wolfe Road
Suite 259
Cupertino, Calif. 95014

(408) 996-2112

AGENCY
ALL FEES EMPLOYER PAID

SPECIALISTS
in recruiting
SALES and
SALES Management
personnel
for the
Data Processing field, Call Brian Burke/send resume. All positions fee paid.

don HOWARD Personnel Inc
120 Broadway, N.Y.C. 10005 • (212) 227-9000
100 Menlo Pk., Edison, NJ 08817 • 201-494-3410
NYC • NJ • Chicago • Atlanta • S.F. • Dallas

DP MANAGER

Irvine based food supplement manufacturer seeks an individual who will be responsible for the operation of the DP Department. Position reports to the Vice President of Finance. Specific responsibilities to include system development, programming, machine operation of an IBM System 3/Model 15 environment and training of supporting staff.
Successful candidate will have experience with IBM System 3/Model 15, RPG-II, and CCP. Experience with computerized manufacturing control systems including forecasting will be helpful. Please send resume and salary history to Vice President-Finance, P.O. Box 16307, Irvine, California 92713.

Software Engineers

As one of the most dynamic and rapidly expanding companies in the computer industry, Amdahl still has excellent opportunities to offer good people who are ready to upgrade their career and work environment.

You will be working on a very large mini-based control system. You should have 1 to 2 years' programming experience with mini-based operating systems or control systems. Your background includes some hardware experience, hopefully with large digital computers, and a BSEE or BSCS or the equivalent experience. Please indicate 436-E on your response and direct it to Employment Manager, Amdahl Corporation, 1250 East Arques Avenue, Sunnyvale, CA 94086. We are, of course, an equal opportunity employer.

amdahl

PROGRAMMERS AND ANALYSTS

Free Employment Service
Northeast, Southeast & Midwest U.S.

Scientific and commercial applications • Software development and systems programming • Telecommunications • Control systems • Computer engineering • Computer marketing and support

Call or send resume or rough notes of objectives, salary, location restrictions, education and experience (including computers, models, operating systems and languages) to either one of our locations. Our client companies pay all of our fees.

RSVP SERVICES, Dept. C
Suite 700, One Cherry Hill Mall
Cherry Hill, New Jersey 08002
(609) 667-4488

RSVP SERVICES, Dept. C
Suite 300, Dublin Hall
1777 Walton Road
Blue Bell, Penna. 19422
(215) 629-0595

RSVP SERVICES
Employment Agency for Computer Professionals

Programmers

At least 2 years COBOL & assembler exp. IBM 370 models. 155/58 in OS-HASP environment. Also opptys for expd RPG II/ANS COBOL programmers.

Excellent salary & benefits with exciting opptys for personal & professional growth. Please send resume in confidence to:

Joyce Albertis
Revlon
Rt. 27 South
Edison, N.J. 08817

Equal Opportunity Employer M/F

DATA PROCESSING PROFESSIONALS

Jr.-Sr. Positions Available: Systems & Applications Programmers, Systems Analysts, Design/Systems Engineers; Business & Scientific Applications; IBM, UNIVAC, CDC, HONEYWELL, HP, Mini & Micro; national & international. Salary $16-42K. Send resume & salary req. in confidence to:
PROFESSIONAL SEARCH PERSONNEL, MIS-EDP Dept, 4900 Leesburg Pk, Alex., VA 22302 (703) 671-0010, No contracts. No fees to you.

BURROUGHS CE's

Experienced on B3500, B4700 and related peripherals. Terminals. Positions available in Florida. Send resumes to:

SYSTEC, INC.

101 Wymore Rd. Ste. 304
Altamonte Springs, Fl. 32701
(305) 862-0203

Yale University
Data Processing Openings

SENIOR APPLICATIONS PROGRAMMER/ANALYST

Requires a minimum of 5 years Data Processing experience with large file application (3 years' programming and 2 years' systems design). Should possess strong analytic and communicative skills. Experience in all phases of systems analysis required. Background in accounting, finance, or economics desirable. IBM, ANS-COBOL, batch and on-line applications environment.

SENIOR SOFTWARE SYSTEMS PROGRAMMER

Minimum of 4 years experience with operating systems internals. Preferred areas would include the proven ability to understand, modify, or rewrite portions of an operating system. OS/360 MVT, HASP experience would be of primary value. CP/67 desirable. Knowledge of various access methods and teleprocessing functions are a prime requirement.

Positions offer excellent starting salaries based on qualifications and background. Liberal fringe benefit program including contributory comprehensive group practice health insurance plan for employee and dependents, life insurance, 12 holidays, 1 month's vacation, employer paid pension plan, university facilities and programs.

Send resume and salary history to:

Mr. B.J. Hayden, Director
Administrative Data Systems
155 Whitney Ave, New Haven, Conn. 06520

Yale University is an Affirmative Action Employer
All interested persons are encouraged to apply.

position announcements | position announcements | position announcements | position announcements | position announcements

Systems Programmer

Challenging career opportunity in our Office of Management Information Services, to help generate and maintain system control program and associated software. We offer a Modern Facility using an IBM 370-148 operating under OS/VS-1 and IMS/VS in batch and teleprocessing modes with expected growth into distributed processing and mini computers. Duties also include trouble shooting software problems and assisting application project teams during systems development. Requires a Bachelor's Degree and three years of experience in general purpose software programming system maintenance. Equivalent combination considered.

Salary range $18,767-$24,878, dependent upon qualifications. Excellent benefits program, including medical and dental insurance, three weeks annual leave, three weeks sick leave, paid overtime, retirement, and free parking. Please send resume, with salary requirements, in confidence to:

Montgomery County Government
Personnel Office, Room 330
100 Maryland Avenue
Rockville, MD 20850

ENJOY A CHALLENGE?

For those willing to accept the challenge, our opportunities are UNLIMITED. At a rate of over 40%, our growth matches our opportunities. It is time to join our dynamic, success-oriented team. We have entry-level engineering openings and in addition we are looking for degreed individuals in the following areas.

Systems Programming

Senior Systems Programmers
Minimum of six years in software development. Work requires a high degree of creative ability and programming skill as well as the ability to act as a project leader. Communications experience and advanced degree desired.

Systems Programmers
Minimum of three years experience in software or system design and development. Activities include development and maintenance of new product line.

Programmers
Performs software function in the development of new products. Requires a high degree of creative ability and programming skill. Typically one year minimum experience with I/O and basic development software desirable.

Engineering

CPU/Logic Design
Minimum of three years experience in logic design. Will provide logic and systems design of minicomputer entral processing units.

Power Supply Design
Requires six years experience in power supply and/or analog feedback circuits. Strong analog background required.

Continuation Engineer
Minimum of six years related engineering experience with familiarity in minicomputers and ability to perform complex system-level problem analysis.

Components Engineer
BSEE and 3+ years experience necessary in the evaluation and selection of components. Will assist engineers in component searches.

Applications

Applications Manager
Minimum of 3 to 5 years experience in digital and analog electronics with 1 to 2 years management experience. Will manage a technical support group for pre and post sales activity.

Senior Applications Specialist
Software / Systems
Minimum of eight years diverse applications experience with one year field exposure and 3 to 5 years machine language programming experience. Will provide in-depth applications support.

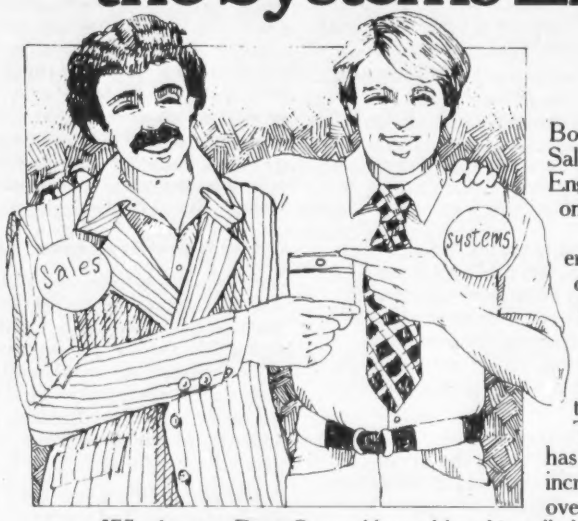
Sales Support Analyst
Requires degree and 2 to 7 years experience, some field exposure/applications experience and general knowledge of hardware and software. Will act as technical liaison between Field Sales Organization and Engineering and Marketing departments.

Instructors
Requires 3 years experience in Real Time digital systems with teaching experience. Will be responsible for the preparation and presentation of courses.

Computer Automation offers benefits surprising for a company our size such as: stock purchase plan, company sponsored Bachelor and Master degree programs, tennis court, volleyball and exercise room. Please indicate your specialty when replying and send your resume to our recruitment team.

ComputerAutomation
18551 Von Karman — Irvine, Ca. 92713
Equal opportunity employer m/f

Who closed the last computer sale—the Sales Engineer or the Systems Engineer?



Both of them. At Data General Sales Engineers and Systems Engineers work hand in glove on every sale.

Together they find the customers, create the systems and do the selling. Both meet with customers. Both present the system they feel meets the specific application. And both provide the technical information to back it up.

This kind of dual capability has helped Data General increase sales from $1 million to over $177 million in 9 years.

What's more Data General has sold and installed over 39,000 computers in 33 countries around the world. And all that money coming in has resulted in a great deal of money going out—to our Sales and Systems Engineers.

Computer Sales Engineers
We require a solid technical background in mainframes, minis or systems—plus the ability to open up new OEM and end user accounts is a must. BSEE with a successful track record in computer hardware sales required.

Computer Systems Engineers
You will use your technical expertise to provide pre- and post-sale software support to our customers and Sales Engineers. You should have minicomputer systems programming experience plus a thorough knowledge of disc-based operating systems in a multi-terminal real-time environment. BS in Computer Science with three plus years experience on Data General NOVA® or ECLIPSE® based systems is desirable.

NORTHEAST & MID ATLANTIC REGIONS
Massachusetts Rhode Island New York New Jersey Pennsylvania Connecticut

To apply for a position in any of the above locations call Charley Polachi collect at (617) 235-8171, ext. 122, or send your resume, including salary history, in confidence to him at Data General Corp., 888 Worcester Road, Wellesley, MA 02181.

MIDWEST REGION
Chicago Minneapolis Omaha Dayton Kansas City Pittsburgh Des Moines Indianapolis Peoria Detroit Toledo

To apply for a position in any of the above locations call Yvette Britt collect at (312) 885-0505, or send your resume, including salary history, in confidence to her at Data General Corp., 1111 Plaza Drive, Schaumburg, IL 60172.

SOUTHWEST REGION
Southern California Arizona New Mexico

To apply for a position in any of the above locations call John Bennett at (800) 225-7347, or send your resume, including salary history, in confidence to him at Data General Corp., 2221 Rosecrans Ave., Suite 204, El Segundo, CA 90245.

SOUTHEAST REGION
Texas Louisiana Georgia North Carolina Alabama Oklahoma Tennessee South Carolina Virginia Florida Mississippi Arkansas

To apply for a position in any of the above locations call Allen Sabourin at (800) 225-7347, or send your resume, including salary history, in confidence to him at Data General Corp., 15 Turnpike Rd., Westboro, MA 01581.

NORTHWEST REGION
Denver Seattle San Francisco Palo Alto

To apply for a position in any of the above locations call Terri Johnson at (415) 321-8010, or send your resume, including salary history, in confidence to her at Data General Corp., 2445 Faber Place, Palo Alto, CA. 94303.

CANADA
Toronto Vancouver Edmonton Ottawa Winnipeg

To apply for a position in any of the above locations call Dale Malpass collect at (416) 259-4271, or send your resume, including salary history in confidence to her at Data General (Canada) Ltd., 415 Horner Rd., Toronto, Ontario M8W 4W3.

DataGeneral
An equal opportunity employer M/F.

position announcements | position announcements | position announcements | position announcements | position announcements

COMPUTER MAINTENANCE TECHNICIANS.

Aramco is expanding its EDP facilities in Saudi Arabia, and now has several multibillion dollar projects under way. A number of openings exist for Computer Maintenance Technicians.

If you are qualified, Aramco will pay you well for your talents. As a rule of thumb, you can expect your net take-home pay in Saudi Arabia to be approximately equal to your gross pay in the U.S. Your chances for advancement are excellent.

The Job.

You would be responsible for the maintenance of real-time minicomputers and peripherals. A solid background in electronics is required, plus training and experience on minicomputer mainframes and peripherals. Peripherals include typers, line printers, ISC drives, magnetic tapes, color CRT consoles, and process interface units.

We have SCADA systems using large numbers of RTV's at remote installations. The job includes diagnostic troubleshooting at the system level, detailed troubleshooting and repairs on specific items, plus routine maintenance and calibration of electromechanical peripherals, RTV's and process interface units.

You must be a high school graduate and have a minimum of 5 years' related experience.

Work schedules.

Successful applicants may be requested to relocate permanently in Saudi Arabia and work a regular work schedule, or work a special "42-21" schedule in which you work 42 consecutive days in Saudi Arabia then have 21 consecutive days off for repatriation to the U.S. with round trip air travel provided. (You would work a 60-hour week with guaranteed overtime pay—something you might not ordinarily get in the States.) Persons working the "42-21" schedule also receive free room and board while in Saudi Arabia.

Other benefits Aramco offers.

Medical care for you and your family is furnished at no charge by the company while you are in Saudi Arabia. On the average of every 12½ months, persons working a regular work schedule will receive 40 days' paid vacation plus round trip air fare to the U. S. for themselves and their families. And to this time off, add another 12 paid holidays each year.

Aramco also offers you good savings and retirement plans. And in addition to your salary, you receive a generous, tax-protected expatriate premium.

Want to know more?

If you're qualified and want more information, write for an application. We will be back in touch with you as soon as possible.

ARAMCO
SERVICES COMPANY
WRITE DEPT. CW0926B, 1100 MILAM BUILDING, HOUSTON, TEXAS 77002

DIVISION PRESIDENT and GENERAL MANAGER

Fortune 500 corporation has immediate opening for proven professional to head its computer product organization on the West Coast. This established company is engaged in the design and manufacture of both OEM and end user products.

Salary and benefits commensurate with experience and ability. Please respond with a letter or resume showing interest, experience, ability and cpensation history in strictest confidence to:

Group Vice President
CW Box 3176 c/o WSJ
Equal Opportunity Employer M/F
All qualified candidates will receive an immediate response!

GAME DESIGNER
Mini Systems
$25,000 - $30,000
Exeter Associates
Executive Recruiters
680 Lafayette Road
Hampton, N H. 03842
(603) 926-6712

SALES ENGINEER

Open up Boston area. Mini-Computer terminal Experience Aggressive/self motivated Excellent Compensation/Commission Package Call: Sal Tassone, N.E. District Manager, Zentec Corp. (914) 592-2151

Data Processing Opportunities

at MACCABEES MUTUAL

an innovative insurance company

based in beautiful Michigan

PROGRAMMER/ANALYSTS

We are an expanding, dynamic insurance organization equipped with one of the most sophisticated Management Information Systems in the industry. To continue, as well as expand our unique services, we have several excellent career opportunities for qualified, knowledgeable DP professionals who possess 3-5 years' experience, preferably with an insurance background.

Utilizing 370/158, operating under VS-1, CICS and ROSCOE environments, puts us on-line for teleprocessing, as well as program developments. ALIS is our individual life processor with on-line AUTO/ISSUE. Languages are COBOL, MARK IV and Assembler.

Candidates selected should have a creative and dedicated approach to individual life processing in incorporating new life, annuity and health marketing aids, implementing new ideas and technology, supporting the overall claims the policy holder serivce, as well as day to day production responsibilities. ALIS experience preferable.

In another area of expansion, we seek an Issue Specialist who will be responsible for meeting the information and processing needs of individual life processing. Another position is also available for a Group Specialist to design and implement a consolidated group processing system for both life and disability income; this requires solid group experience; on-line experience and data base design experience a plus.

Salaries for these positions are excellent, based on experience, plus first class benefits package that includes tuition assistance and profit sharing programs. In addition, we'll relocate those selected to our headquarters outside of Detroit, easily accessible to the magnificint Michigan vacationland areas.

Personal interviews with applicants will be arranged promptly. For consideration, please submit detailed resume or letter, outlining education, experience and salary history and requirements in strictest confidence to: E. Mandt, Vice President.

MACCABEES MUTUAL LIFE INSURANCE COMPANY
25800 Northwestern Highway
Southfield, Michigan 48075
An equal opportunity employer M/F

---

21 START-AT-HOME D.P. BUSINESSES

127 page research report uncovers areas never published, plus hundreds of how-to-do-it ideas on moonlighting, starting up, image building, bidding, contracts, failure signals, and much more. A superior career planning tool $12.00 (check, Mastercharge, Bankamericard) Guaranteed Refundable, to **DATASEARCH INC., Suite 108G, 730 Waukegan Rd., Deerfield, IL 60015. Tel. Orders (312) 945-2940**

EDP SALES
FIELD SERVICE ENGRS.
SYSTEMS ENGINEERS
RAY HARRIS

has placed over 1,000 people in these professional areas.

Openings now exist thruout the Eastern U.S. with all recruitment and relocation fees paid. For details contact Mr. Harris ar

LLOYD PERSONNEL
10 Cutter Mill Rd.
Great Neck, N.Y. 11021
(516) 466-6670

EDP
SPECIALISTS
Nationwide

- Mgr Corp. Sys Dev To $35K Midwest location
- DP Mgr top co spotTo $35K Penn location
- Mgr Pharm Rsch Sys Suburban NY location To $31K
- Porj Mgr Fin/mfg To $24K Upstate NY location

Fees assumed by client co's

LESLIE, KAVANAGH
505 5th Av, NY, NY 10017
(212) 661-0670 (agency)
Corporate Inquiries Welcome

IMS DISTRIBUTIVE PROCESSING

Expanding from IMS/VS DB to full IMS/VS DB/DC. Opportunity to get in on the ground floor. Distributive processing our goal. Resources available: 370/158, 3790, MVS and NCP/VTAM. IMS/VS DB/DC release 1.1.4 currently on order.

IMS DATA BASE DESIGN SPECIALIST

Responsibilities will include systems generation and maintenance, system performance monitoring and tuning, and error identification and debugging.

The successful candidates will have extensive IMS/VS DB/DC internals experience. Working exposure with MVS. Knowledge of NCP/VTAM, 3790, and/or SMP a plus.

We offer excellent salaries, benefits and growth opportunities. Send resume including salary history in strict confidence to: J.R. Brune, Amtrak, 955 L'Enfant Plaza SW, Washington, DC 20024.

IMS SYSTEMS PROGRAMMERS

Responsibilities will include Data Base design, data dictionary maintenance, Data Base performance monitoring and tuning, and technical support.

The successful candidates will have extensive IMS/VS DB experience. Working exposure with the DC facility. Knowledge of JCL and COBOL and MARK IV a plus.

An Equal Opportunity Employer M/F

Amtrak

COMPUTER PROFESSIONALS

Our modern computer center located in Linden New Jersey is experiencing rapid expansion and currently seeks talented individuals for the following positions:

MANAGER-TECHNICAL SUPPORT

This new position has been created to provide full systems support to operating management. Reporting directly to the Vice President, the individual we seek must have a thorough knowledge of the B-6700 Hardware and Communication equipment, plus a detailed understanding of the MCP, DMS and NDL Software. Must also be knowledgeable of on-line banking systems.

COBOL SYSTEMS & PROGRAMMER ANALYSTS

Three to seven years COBOL experience required; Burroughs DMS II and on line banking experience highly desirable.

These positions offer extremely competitive salaries, outstanding fringe benefits and exceptional growth potential.

Send resume including salary history and requirements in confidence to: PERSONNEL DIRECTOR.

The NATIONAL STATE BANK

68 Broad Street
Elizabeth, N.J. 07207
An Equal Opportunity Employer M/F

Software Development

Systems Programmers

Our Software Department that designs and implements compilers, operating systems, and record management systems has doubled its size in the last two years and is still expanding rapidly. Due to this extraordinary expansion, the opportunities for growth in our organization are unmatched in the industry. We have several openings for Systems Programmers at all levels.

Your ability to learn and enjoy software development in a fast changing organization is more important than your specific background. The only firm requirement is that you have at least 2 years experience in assembly language programming, and a strong desire to learn operating systems and/or compiler run time systems development. A BS or equivalent, familiarity with PDP-11, RMS-11, RSTS/E and RSX-11M, or a knowledge of BLISS would be helpful.

If you have the energy, talent, and resourcefulness to become an important contributor in this fast-paced environment, please send your resume, including salary requirements to Joe Hart, Digital Equipment Corporation, Dept. B919, 162 Main St., Maynard, Massachusetts 01754. We are an equal opportunity employer m/f.

We're the company looking for people.

digital

San Diego opportunity in advanced-technology EDP SYSTEMS DEVELOPMENT

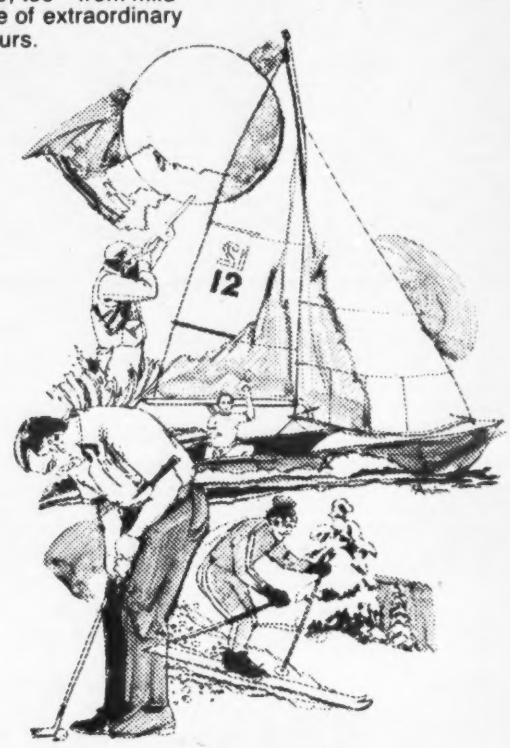
Want to combine the ideal career opportunity with your favorite lifestyle? NCR Special Systems Division needs your help now in developing advanced, high-technology EDP systems for customers around the world. You'll be doing important work in our Sorrento Valley facility, just three miles from the ocean and only minutes from Torrey Pines, La Jolla and downtown San Diego. You can live in the setting of your choice—beach, valley, mountain, country, small-town or urban—and still be only a short drive from work. Spend your leisure hours golfing, swimming, hiking, getting advanced degrees from major universities, attending theatrical, music, art and sports events, or soaking up the year-round sun. Pick your climate, too—from mild coast to dry desert. San Diego is a place of extraordinary choices—and right now the choice is yours.

COMPUTER PROFESSIONALS

The Special Systems Division has opportunities for software professionals in a broad range of disciplines and in all experience levels. Our current and firm future programs require top people with experience in any of the following areas:

- TELECOMMUNICATIONS SOFTWARE
- FILE PROCESSING
- NETWORK DEVELOPMENT
- LARGE MAINFRAME, MINI and MICRO PROCESSOR
- OPERATING SYSTEMS
- COBOL APPLICATIONS
- ASSEMBLY LANGUAGE

Assignments will include the development and implementation of various EDP systems for specific customers as well as the development of future NCR total systems; both requiring state-of-the-art knowledge.



Our benefit package is what you would expect from a major blue chip corporation. What you might *not* expect is the relaxed and very creative environment of this small, highly specialized division. The facilities are modern, comfortable, designed to provide an atmosphere in which every employee can achieve an uncommon degree of personal and professional satisfaction. May I offer you the opportunity to judge for yourself? Please send your resume (with salary history) to me,

Thom Harris, Employment Specialist

NCR

SPECIAL SYSTEMS DIVISION
4046 Sorrento Valley Blvd.
San Diego, Calif. 92121
We are an equal opportunity employer

DATA TERMINAL SALES

If your career path is in sales, this is a unique growth opportunity for aggressive, enthusiastic Data Processing or Communications Professionals. We are a full line computer terminal company breaking away from the pack with an exciting new product. A sophisticated micro-processor based flexible disk controller with an untapped, wide open marketplace. Full management and technical support. The most advanced field service capability in the business.

Excellent compensation through salary and commission. To explore this sales opportunity, write to Personnel Dept. or call Mr. Hansen 800 631-7050 Ext. 423.

western union data services

Systems Analysts/Programmers
Systems Programmers

We have immediate openings for experienced Systems Analysts/Programmers and Systems Programmers. Insurance background desirable but not essential. COBOL, PL/1 or BAL desired. Large (4 meg) 370/158-AP installation currently migrating from OS/MVT to MVS with CICS/VS and TSO. Formal career path development program with excellent promotional opportunities. Progress sharing, excellent salary and working conditions, free parking and liberal benefits.

Please send resume and salary history for confidential review to:

Mrs. Pearl Evans, Senior Consultant
STATE MUTUAL LIFE ASSURANCE COMPANY OF AMERICA
440 Lincoln Street
Worcester, MA 01605

MEMBER OF THE AMERICA GROUP

an equal opportunity employer M/F

Computer System & Software Engineers

You can get ahead faster with us than with anybody else.

Here's why:

1 You are needed right now. Our project teams are crying for good professionals who can grab hold fast.

2 You'll get a chance to prove how good you are. Everybody is evaluated regularly; there are no missing persons at TI. If you're good, you move up fast. No matter how long the people above you have been there.

3 You'll be involved in state-of-the-art projects. Air Traffic Control. Satellite navigation systems. Landing systems. Radar and infra-red sensor systems. Computer-aided design, manufacturing and electrical test systems, machine tool control, text processing and process control. Acoustic data and image processing. In addition, an Advanced Software Technology Department has been formed to develop state-of-the-art tools, procedures, and languages for computer system design and software production. TI is the technological leader in literally scores of product fields. This leadership has produced more than 5,000 patents.

4 You'll work on a complete system. No threat of getting locked into a repetitious specialty. You'll work on a small project team. You'll interface daily with other disciplines and other phases of your overall program.

5 You'll work in a job-stable, multi-market situation. We have a variety of products and markets. We're not heavily dependent on any one of them – and neither is your job.

Entry Level or Experienced Openings for U.S. Citizens

Software System Designer
M.S. in Computer Science or Engineering and experience in design of software systems for real-time and interactive systems.

Computer System Engineer
M.S. or PhD in Electrical Engineering or Computer Science and five years experience in hardware and software design of real-time computer systems.

Engineering System Analyst
M.S. or PhD in Math, Physics, Computer Science, or Engineering, and experience in analysis of engineering systems.

Programmers
B.S. in Computer Science, Math, Physics, or Engineering and programming experience with higher order languages such as Fortran, Pascal or PL/I. Both scientific and real-time programmers are required.

Language Processor Designers
M.S. or PhD in Computer Science and three years experience in development of programming languages, compilers, translators, assemblers and link editors.

Send your resume in confidence to:
Staffing Manager/P.O. Box 6015, M.S. 222/Dallas, Texas 75222.

TEXAS INSTRUMENTS
INCORPORATED
An equal opportunity employer M/F.

Systems Programmers

Accept the Challenge of Advanced Technology

The Leader in Dispersed Data Processing is looking for systems programmers who are eager to accept the challenge of this fast-paced field. Due to our expanding business Datapoint Corporation has several openings in its software development operation. Applicants should have at least three years' experience in software development, together with a functional background in at least one of the following areas: operating systems, data communications and language development.

If you are an individual who is looking for a challenging, productive environment in which to work, and are excited by the prospect of working with advanced technology, Datapoint could be the place for you. We offer outstanding salary and benefits, rapid advancement, and the opportunity to work in our corporate headquarters in San Antonio, Texas, one of America's unique cities and an area which affords excellent living, working and recreational opportunities.

For more information, send your resume, with salary history, to
Mr. Losan Damewood, Manager/Administration and programs. Dept. CW Datapoint Corporation, 9725 Datapoint Drive, San Antonio, Texas 78284

An Affirmative Action Employer Committed to Equal Opportunity

DATAPOINT CORPORATION

The leader in dispersed data processing™

Mini Computer Software

18-28K
Idealistically

Candidates will possess proven and demonstrated abilities in operating systems, communications, and in language development with a 16 bit real-time processor. Along with knowledge of data base technology in such areas as view support, data semantics, query optimization, distributed data bases, and data base user interfaces. Will have consulted with product development groups, and participated in system design reviews. Responsibilities will also have included initial planning and specification of all new computer software. The individual should possess the ability to participate in establishing hardware/software tradeoffs and be able to assume complete project responsibility.

Realistically

We seek computer professionals capable of contributing to any of the above efforts in a high technology computer development firm. We offer a technically stimulating work environment along with excellent and liberal benefits, vacations and paid holidays. If you would be interested in exploring this opportunity further please call or forward resumes to:

MULTI PROCESSING, INC.
Four Milita Drive
Lexington, MA 02173
(617) 861-6300

861-6300

Sr. Prog./Analyst to 23K
I.M.S. COBOL-BAL Lots of customer interface exec. benefits & growth potential. Call: Ray Cech (213) 653-5385.

Sys. Prog./Soft. Dev. to 24K
Large Scale Systems, Data Base/assembly, Super opportunity for upwardly mobile indiv'l. Call: Dale Dempster (213) 776-5333.

Send resume to:

Dunhill

6404 Wilshire Blvd.
Suite 1110CW
Los Angeles, CA 90048

WINTER IS COMING!

Looking forward to the slush and the biting cold? Now is the time to plan your career move to the Sunbelt. Major corporations are moving South or expanding their Southern operations and are looking for top notch EDP candidates in the Banking, Finance or Manufacturing Industries. Programmers and analysts with backgrounds in large scale hardware have available to them career opportunities, solid advancement, and a lifestyle low in taxes and high in enjoyment. Why wait till the first snow? Send your resume in complete confidence to:

DSA DAVE STANEWICK & ASSOCIATES, Inc.
9300 S. DADELAND BOULEVARD
SUITE 508, DADELAND TOWERS
MIAMI, FLORIDA 33156
DADE (305) 666-5881

OVERSEAS COMPUTER ADVISOR/ CONSULTANTS

Your opportunity to play a crucial role in a consulting capacity for the fastest growing, modernizing Mid-East Navy.

Selected staff will direct development and implementation of automation techniques employing state-of-the-art management and ADP capabilities. Requires the ability to plan, direct and review data management subsystems as follows:

Administrative (PPB)
Management Information Systems
Logistics Systems
Maintenance Management
Facilities Management (H-6000)

All positions are in direct support of the Imperial Iranian Naval Forces and are located in Tehran. For full details please send resume to V.P.: METIER INTERNATIONAL, INC., 1401 Wilson Blvd., Arlington, VA 22209.

METIER INTERNATIONAL INC.
1401 Wilson Blvd.
Arlington, Va. 22209
Representing an Equal Opportunity Employer

position announcements | position announcements | position announcements | position announcements | position announcements

TIME FOR A CHANGE?

Cadillac's EDP placement service is without cost to you. Companies pay all fees and expenses. Client firms are located nationwide, and are engaged in all industries — Manufacturing, Banking, Insurance, etc.

Immediate needs include:

Programmers (1-2 Yrs)	$13-16K	Software Prog (5+ yrs)	$21-27K
Prog/Analysts (2-5 yrs)	$15-21K	Mgrs, IBM S/3, RPG-II	$17-22K
Analyst/Prog (5+ yrs)	$18-23K	EDP Auditors	$19-23K
Sr. Anal/Project Mgrs	$20-25K	Mgmt. Science Analysts	$17-24K
Software Prog (2-5 yrs)	$18-23K	Scientific Programmers (mini's, etc.)	$16-23K

We offer assistance in evaluating your present position. Just send your resume and we will call you to discuss your objectives and explain how we might help you reach your goals.

FREE — EDP OPPORTUNITIES BULLETIN, a representative list of our career opportunities, mailed free of charge upon request.

For more information on our "fee-paid" placement service, send your resume to:

Mark Fuller
CADILLAC ASSOCIATES, INC.
32 W. Randolph St., Chicago, IL 60601
(312) 346-9400

Software Engineers

Our expanding product lines have opened several challenging positions to qualified software engineers in the following disciplines:

Project Engineer

To develop the architecture for a modular system, which also contains resident diagnostics using microprocessors. BSCS or BSEE and experience in system design. Hardware familiarity helpful.

Evaluation Engineers

To evaluate diagnostic routines for testing Microprocessor Development Aids and similar products. Minimum of BSCS or BSEE with hardware and software knowledge. Design or evaluation experience necessary.

Design Engineer

Software engineer for microprocessor system programming. Will interact with digital design engineers and operating system programmers to develop software support for a variety of microprocessors. BSCS or BSEE and familiarity with digital hardware. Extensive assembler language software experience, microprocessors or minicomputers helpful.

Diagnostic Programmer

Maintain existing diagnostic programs and work closely with digital design engineers during development cycle. Write diagnostic program for circuitry under development. BSCS or BSEE and ability to read digital schematics to the gate level. Assembler language background necessary.

Salary is open. Benefits include liberal insurance, educational support and profit sharing programs.

Send detailed resume and salary history to Mary Walhood, TEKTRONIX, INC., P.O. Box 500, C81, Beaverton, Oregon 97077.

An Equal Opportunity Employer M/F/H.

Tektronix
COMMITTED TO EXCELLENCE

DATA PROCESSING PROFESSIONALS

For key research support assignments at Lederle's DEC System 10, PDP-11 installation.

If you're an innovative professional, consider the demanding assignments and solid potential for growth you can have with this leader in pharmaceutical and medical technology. You'll join the expanding staff at our Pearl River, N.Y. EDP center — located just 30 miles from New York City — and make vital contributions to programs that meet our diversified, large-scale research requirements.

The opening in our MEDICAL DATA GROUP is for:

SENIOR SYSTEMS ANALYST

Will plan, design, and develop systems that support clinical research programs. Assignments will emphasize data base applications and user-oriented software. Requires MS in Math or Computer Science, at least 3 years experience developingand implementing computer systems, large scale data base background, and knowledge of FORTRAN and COBOL. Familiarity with SAS and INQUIRE desired.

The openings in our LABORATORY AUTOMATION GROUP are for:

SENIOR INSTRUMENTATION SCIENTIST

Will be project leader for lab engineers and computer hardware analysts. Requires MSEE and 5-10 years of experience. Also essential are knowledge of minicomputer hardware (PDP-11's), analog data reduction techniques, and computer interfaces to analytical instruments . . . familiarity with life science equipment, engineering and mathematical modeling, and communications network design.

SENIOR SYSTEMS ANALYST

Will be project leader for Systems Analyst and Analyst Programmers with technical responsibility for applications in various real time environments. Requires MS in Computer Science, Math or Life Science and 5-10 years experience. Knowledge of PDP-11 Operating Systems (RSX-11M & RT-11), and practical knowledge of MACRO-11, analog data reduction techniques, and image data processing necessary.

LABORATORY APPLICATIONS ENGINEER

Will design hardware/software sub-systems in research laboratory environment. Involvement will include hardware design, data acquisition and reduction systems. Requires BSEE with Computer Science exposure and 3-5 years experience. Knowledge of PDP-11 hardware strongly preferred.

ANALYST PROGRAMMER

Will develop application programs in research lab environment including laboratory data acquisition and reduction systems. Requires BS in Computer Science, Math or Life Science and 1-3 years experience. Knowledge of PDP-11 Systems desirable.

We provide fully commensurate salaries for all positions and excellent benefits. Send resume, including salary history, to Mr. G.J. Stein.

LEDERLE LABORATORIES
American Cyanamid Co.
Pearl River, N.Y. 10965

Lederle

An EOE M/F

The ROMAC DIFFERENCE

A Local Call Goes A Long Distance

Call or visit the Romac office nearest you, and make contact with our expert personnel consultants. Experienced executives constantly in-touch with key executives and top management in EDP, Accounting and Banking.

Your local call gives you access to Romac offices in 12 major eastern cities. You're not restricted to searching your immediate area. You have access to the best openings, in your industry as well as the best professionals available. All that for just a local call. That's the Romac Difference.

ROMAC
& ASSOCIATES/
Personnel Consultants

Contact Romac & Associates, A. L. Lemay, President; 2 Sun Life Executive Park, Wellesley Hills, MA 02181 for transmission to our Partners in Atlanta, Boston, Buffalo, Charlotte, Hartford, New Haven, New York, Philadelphia, Portland, Rhode Island, Rochester/Syracuse, Stamford.

COMPUTER PROFESSIONALS

Minicomputer Programmer

Duties include the development of real time mini and/or micro computer software as applied to process control, data acquisition, and interactive graphics. Bachelor's Degree is required with an M.S. in Computer Science or Electrical Engineering desired. Experience in software/hardware development on DEC and/or Data General minicomputers is desirable.

Microprocessor Application Engineer

Duties include the development of hardware and software systems for microprocessors which are applied to data acquisition, process control, instrument development and communictions. A Bachelor's Degree in Electrical Engineering is required with an M.S. desired.

Data Base Management Systems Analyst

Duties include the design and implementation of data bases and the use of existing DBMS packages is required with a minimum of four years experience in using data base management systems. You must be strongly user oriented and capable of assuming a leadership role in determining and directing data base management activities in a research laboratory.

Opportunity for professional advancement is excellent for those having good communication and leadership skills. The positions offer challenging work in a diversified research laboratory environment. Battelle is a prime contractor for the U.S. ERDA and also performs contract research for other sponsors. Send confidential resume stating specific position in which you are interested in confidence to E.P. Galbraith.

Battelle
Pacific Northwest Laboratories
Battelle Boulevard
P.O. Box 999
Richland, Washington 99352

position announcements | position announcements | position announcements | position announcements | position announcements

TANDEM

Non-Stop Opportunity

We are the only manufacturer who offers a non-stop multiple processor computer. It's the most important development in computer architecture since the development of the minicomputer itself. It's proven in the field. It's working in a wide variety of industries: banking, manufacturing, distribution, medicine, printing and publishing, in communications. It's great. It's growing.

And we are growing, too.

If you have the background, drive and enthusiasm to make your mark with and for the company which pioneered non-stop on-line transaction processing, we have significant openings in senior sales and systems positions in key cities throughout the country.

You can show us how you'll contribute to our growth, coming from a minimum of three years directly applicable experience. We have the openings now for men and women who enjoy the challenge and opportunities of working with the leader in the field who is still small enough to recognize—and reward—their contribution.

The opportunity is real. The rewards are significant. If you're the one who's ready for this kind of a package, write or call with the information we'll need to recognize your potential.

Sam Wiegand, Vice President, Marketing
Tandem Computers, Inc.
20605 Valley Green Drive
Cupertino, California 95014
800-538-9360 or 408-255-4800 in California
An equal opportunity employer

TANDEM

We can give you 3 good reasons to call Robert Half for data processing positions:

1. Robert Half has been in business for about 30 years. Can you name an EDP personnel service that's been around longer?
2. Robert Half specializes. We've been an integral part of the data processing community through all its generations.
3. Robert Half's offices are staffed by experts in the EDP field.

and if 3 reasons aren't enough, we can give you 55 more:

55 offices. Robert Half is a network throughout the U.S., Canada and Great Britain. One call and you've searched the local market ... or the world.

and if 58 reasons aren't enough, we can give you Half a reason more:

Robert Half. Where integrity is a lot more than just HALF.

ROBERT HALF PERSONNEL AGENCIES

Look in the white pages.

Data Processing Management Consulting

Expanding International Firm of CPAs seeks computer system professionals for openings in New YOrk, Washington, Cleveland, Hartford, Atlanta, Chicago, Kansas City, St. Louis, San Francisco, and other U.S. offices. Skills in two or more of the following areas are required:

- **Evaluation and selection of hardware and software;**
- **Systems feasibility and cost/benefit evaluation;**
- **Project management/quality control of development projects;**
- **Computer performance evaluation.**

Qualified individuals must possess BS degree (Master's degree desired), up to five years recent in depth technical data processing experience, strong skills in oral and written communications, programming and/or system analysis. Travel required depending upon location. Salary in the $17-$28,000 range.

For an outstanding career in management consulting, submit resume including salary history and geographic preferences to: Mr. D.C. Bird.

CW Box 3177
797 Washington St.
Newton, Mass. 02160
An Equal Opportunity Employer M/F

SYSTEMS ANALYST

Insurance Applications

Our client, an upper New York State based Property & Casualty Insurance Company, seeks an individual to guide & develop it's automobile & home owner's systems. THe atmosphere is professional but informal.

Ideally, the successful candidate will have experience implementing either auto or home owner's applications. Related experience will be considered. Excellent growth opportunity and fringe benefit package. Above average compensation.

Reply in confidence to:
Richard Linch

ROMAC
& ASSOCIATES/Personnel Consultants
P.O. Box 67, Orchard Park, New York 14127
Telephone: (716) 853-6203

Instructor

Several good reasons you should move to Itel.

First and foremost is Itel's new Advanced System (TM). We just introduced the only sensible alternative to the IBM 370. It's more powerful, more efficient and twice as reliable. So we know it will sell. Big. Which means more growth for us and a greater need for more good people.

Another good reason is our new facility in Palo Alto's Stanford Industrial Park. It offers convenience, the latest in technology and excellent working conditions. They all add up to the kind of working environment we want to provide for our employees.

The Advanced Systems and our new facility are just a couple of the exciting things that are happening at Itel. Our continued growth has created an immediate opening for an Instructor with IBM CPU background, preferably with IBM 370/158/168 and 3800 printer.

Itel offers an excellent benefits program, salaries commensurate with qualifications and experience.

For immediate consideration, please submit a resume in confidence to: ITEL Corporation, Personnel Department, 3145 Porter Drive, Palo Alto, CA 94304. An Equal Opportunity Employer M/F.

ITEL CORPORATION
FIELD ENGINEERING DIVISION

SYSTEMS ANALYST

Systems Designer experienced in computerized subscription fulfillment work for rapidly expanding service bureau on Long Island. Call Mr. H. (516) 249-0860. Monday-Friday.

MATHEMATICS AND COMPUTER SCIENCE

PhD in computer science or electrical engineering to teach courses in the logical design of computer hardware systems design, telecommunications, computer networks, FORTRAN, and COBOL. Twelve hour week teaching with six weeks summer teaching usually available. Send resume to Dr. Merritt N. Sugg, Chairman, Department of Mathematics and Computer Science, University of Arkansas at Little Rock, 33rd and University, Little Rock, Arkansas 72204, An Affirmative Action Employer.

BURROUGHS PROGRAMMER ANALYST

A major New York City bank needs a professional Burroughs Programmer/Analyst for a challenging and creative position. Duties will include modifying and enhancing banking systems which operate on Burroughs L-series computers, developing long range systems plans for the bank's subsidiary companies in Miami, Houston, San Francisco, and Toronto, and designing banking applications for future development. There will be travel from New York headquarters to the cities listed above. The candidate will operate relatively independently and must possess strong communications skills. The salary range is to $24,000, plus an unusually liberal benefits package including profit sharing.

P.O. Box 226-Dept. 10
Church Street Station
New York, N.Y. 10008
Equal Opportunity Employer

position announcements | position announcements | position announcements | position announcements | position announcements

OMICRON

Consultants to the Computer Industry

OMICRON, a professional data processing search firm, based in the SAN FRANCISCO BAY AREA, offers opportunities including:

SYSTEMS PROGRAMMERS

Requires IBM/370 OS, MVS, VM or VS2 experience and strong assembly language. Salary to $27K.

IMS SPECIALIST

Must have either IMS applications experience or systems software background. Will participate in an IMS software effort. Salary to $26K.

For these and other outstanding career opportunities, please call or write, in confidence, to:

OMICRON INC.

415/546-7200
One Ecker Street
San Francisco, CA 94105

415/328-6150
525 University Avenue
Palo Alto, CA 94301

Exclusively Employer Retained Agency

PROGRAMMER/ ANALYSTS

Become part of a dynamic, growth-oriented company in the manufactured housing industry. Headquartered in the prime outdoor activity area of Central Wisconsin, Wick Building Systems, Inc., with 13 manufacturing facilities, is the nation's sixth largest manufacturer of mobile homes and the sixth largest manufacturer of panelized homes.

To accommodate our dramatic growth record, our data processing department has need for experienced programmers with a minimum of one year programming experience to work in an IBM 370 environment with teleprocessing which is moving toward PL/1 and Data Base. We offer excellent salary and benefits as well as a participative management environnment which allows for professional and personal growth.

For more information, send resume with salary history to: Programming Manager, Wick Building Systems, Inc., P.O. Box 790, Marshfield, Wisconsin 54449. All resumes submitted will be handled on a completely confidential basis.

An Equal Opportunity Employer M/F

WICK building systems inc.

COMPU SEARCH®...

specializes in careers for you...

See us in your city

Since 1968, CompuSearch has sought out exceptional individuals with data processing related skills for large and small companies throughout the United States. We also have been very successful in locating challenging new positions for thousands of people who have requested our assistance. If you are a talented achiever interested in learning about situations that will best meet your goals, contact our office nearest you in complete confidence. We keep a close watch for the best available opportunities locally and nationally.

Arlington, TX	(817) 469-6161
Atlanta N.W., GA	(404) 955-2785
Boston, MA	(617) 262-5050
Buffalo, NY	(716) 852-5520
Charlotte, NC	(704) 535-5220
Cincinnati, OH	(513) 651-5500
Columbus, OH	(614) 436-3200
Dearborn, MI	(313) 336-6650
El Paso, TX	(915) 778-9411
Fayetteville, NC	(919) 483-2555
Indianapolis, IN	(317) 257-4261
Kinston, NC	(919) 527-9191
Lansing, MI	(517) 694-1157
Los Angeles, CA	(213) 930-1313
Louisville, KY	(502) 456-4330
Milwaukee, WI	(414) 273-4430
Minneapolis, MN	(612) 333-8560
Omaha, NE	(402) 397-8115
Pittsburgh, PA	(412) 343-7410
Rochester, NY	(716) 325-1660
Sacramento, CA	(916) 920-0441
St. Louis (Clayton), MO	(314) 644-5959
San Francisco, CA	(415) 362-0911
Southfield, MI	(313) 569-2828

COMPU SEARCH®
Division of Management Recruiters

SALES SUPPORT ANALYSTS

Move Up With The Best!

We offer more than just a job!

DO YOU WANT:
- Challenge
- Responsibility
- Diversity
- Personal/Professional Growth
- Professional Environment

DO YOU HAVE:
- Computer Science degree (or equivalent)
- FORTRAN and some Assembly language experience
- GOOD COMMUNICATION SKILLS
- Ability for some travel
- Desire to Excel

THE BACKGROUND:

Computer graphics is our specialty at Tektronix Information Display Group, and we grew 50% last year alone. We're meeting our challenges head on, but we need more top people to help us. We offer competitive salaries, good benefits, and the opportunity to reach your potential peak in the near future. We will back you with the training, the office services, the products, and the technology that has revolutionized our end of the computer industry . . .

GET THE DETAILS:

For further information, Call Collect or send resume to:

Lou Gennaro
TEKTRONIX
2 Research Court
Rockville, Maryland 20850
(301) 948-7151

An Equal Opportunity Employer M/F

TECHNICAL WRITERS

Harris Corporation, Computer Systems Division, has the following Technical Writer positions available in our Fort Lauderdale location.

SENIOR SOFTWARE TECHNICAL WRITER

Will research, write and edit reference and user software manuals; direct a small group of software writers; interface effectively with systems software analysts and publications personnel. The successful candidate will have at least 2 years' experience in software, technical writing, a degree preferably in English or Computer Science.

HARDWARE TECHNICAL WRITER

Positions are now available for Technical Writers to prepare technical documentation for HCSD projects using applicable specifications and engineering information. Will coordinate writing, illustrating and composition tasks on assigned projects. Digital logic background and 3-5 years' publications experience required.

Send resume in strictest confidence to W.D. Taylor, Harris Corporation, Computer Systems Division, 1200 Gateway Drive, Fort Lauderdale, Fla. 33309.

HARRIS
COMMUNICATIONS AND INFORMATION HANDLING

An Equal Opportunity Employer—Male and Female

PROGRAMMERS & PROG ANALYSTS

IMS, COBOL, FORTRAN, BAL or CICS experience. All levels for varied assignments with a leading software consulting firm in NYC and NJ area. CHallenging projects. $15-27,000 Fee Paid

ROBERT HALF PERSONNEL AGENCIES
522 Fifth Avenue
New York, N.Y. 10036
(212) 221-6500

WANTED: EXPERT PROGRAMMER

We are the leading manufacturer of industrial programmable controllers - minicomputers and microprocessor-based systems used for industrial automation.

Our Software Engineering Operation has doubled in the last year and we need good people badly. We want experience in the assembly language, microprogramming microprocessors, real-time control applications, and some familiarity with hardware at all levels of experience.

We offer excellent wages, generous fringe benefits, and a pleasant atmosphere for advancement and growth.

Please send resume with salary requirements to the Personnel Department.

MODICON

THE PROGRAMMABLE CONTROLLER COMPANY
P.O. Box 83
Shawsheen Village Station
Andover, MA 01810

An Equal Opportunity Employer

FLORIDA ATLANTIC UNIVERSITY

DIRECTOR, UNIVERSITY COMPUTER CENTER

Florida Atlantic University is an upper division university serving the residents of Southeast Florida. The computer center is part of a growing statewide computer network and supports a large number of computer-intensive academic programs, extensive administrative applications, and a growing research activity. Hardware and operating systems support is provided via the Southwest Regional Data Center and the Northwest Regional Data Center with Univac 1108 and 360 equipment respectively.

Requirements: bachelor's degree in accounting, management, computer science, mathematics, industrial management, or other closely-related fields with extensive training in computer concepts; five years experience in electronic D.P. work or any equivalent combination of experience and training in all phases of computer facility operations. This management position requires extensive managerial and supervisory experience with heavy emphasis on systems analysis and programming, preferably in an educational environment. Salary up to mid-twenties based upon credentials and experience. A letter of application and resume should be submitted no later than October 1, direct materials to Dr. William M. Hunt, director, planning and evaluation, Florida Atlantic University, Boca Raton, Florida 33431.

An Equal Opportunity/Affirmative Action Employer. A member of the State University System of Florida

DATA PROCESSING

BOSTON AREA OPENINGS

Data Center Manager $25,000

Growth opportunity for a systems programmer. Strong technical background. Operations experience a plus. IBM/370 hardware.

Programmer/Analyst $15 - $18,000

Excellent technical opportunity - implementing CICS and DL-1. Minimum 1 year DOS/COBOL a must. BAL a plus. Fortune 500 company.

Programmer $14 - $17,500

Large Boston manufacturer - minimum 3 years experience. RPG II System -3 manufacturing experience a plus.

Contact Jim Staunton (in confidence)

617-423-6440

All Positions Fee Paid

ROBERT HALF
FINANCIAL & EDP PERSONNEL SPECIALISTS
140 Federal Street, (23rd floor), Boston, MA 02110
Member Firm - Mass. Professional Placement Consultants

position announcements | position announcements | position announcements | position announcements | position announcements

COMPUTER SCIENCE PROFESSIONALS

MEET THE CHALLENGE WITH GULF

Build a meaningful career in Southwest Houston at Gulf Oil's newest and most advanced computer complex. Gulf Science & Technology, one of the operating companies of Gulf Oil, offers an excellent benefit package and competitive starting salaries for:

Applications Programmers

Prerequisites include a degree in Computer Science or related field, two years experience in Commercial Applications Programming using COBOL and/or ALC in a 370/OS-VS or MVS environment. Experience with IMS, TSO and VSAM a definite advantage.

Systems Programmers

Prerequisites include a degree in Computer Science or related field and/or experience with systems software. Prefer knowledge of ALC, compilers, systems architecture, and programming support of IBM OS/MVS and JES3 under 370/168 Systems. Primary duties could involve active participation in operation system maintenance of large TP network (NCP/VTAM), IMS, TSO, CICS and Batch Processing.

Qualified applicants are invited to submit their resumes including salary history to:

Gulf

Curtis P. Guyote
GULF SCIENCE & TECHNOLOGY CO.
Drawer - T71
P.O. Box 36506
Houston, Texas 77036

An Equal Opportunity Employer M/F

ASSOCIATE DIRECTOR UNIVERSITY COMPUTER CENTER

The Associate Director is a professional computing center administrator who works with the Computing Center Director in the development and implementation of policy. The position is staff (as opposed to line) and involves broad responsibilities including working with university administrators and computing center staff in setting budget priorities, overseeing budget allocations, report preparation, assisting in relations with computing center users and university administrators, management of personnel transactions, and other procedural actions as necessary to support the Director in the performance of directorate level functions.

A thorough background in computer service technology is required preferably including experience in all functional areas of a computing center. Working knowledge of a large university system is highly desirable. Send all applications to:

Lee B. Jones,
Dean, Graduate College
Administration 501
University of Arizona
Tucson, Ariz. 85721

no later than Oct. 12, 1977. An Equal Opportunity/Affirmative Action Title IX/Section 504 Employer.

SyncSort:

TECHNICAL SERVICES

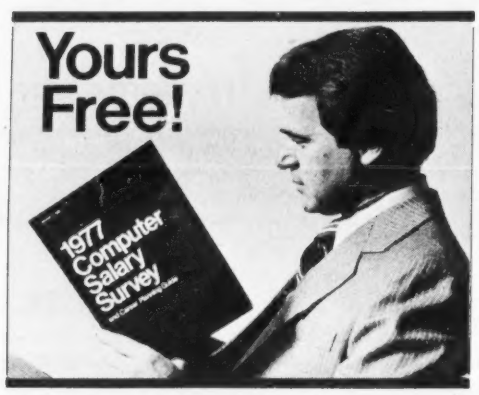
If you're ambitious, quick to learn, and want to expand your knowledge of IBM systems through an important and active role in customer support, you may be the person we're seeking.

To qualify you'll need:

- **Thorough knowledge of OS JCL and utilities;**
- **Working knowledge of IBM operating systems concepts;**
- **Knowledge of assembler language.**

We're a young and successful company, proud of our high-performance products and the people who develop and support them. Our compensation and benefit packages are outstanding. Most of all, you'll have an opportunity to make a contribution to state-of-the-art software, Send a resume in confidence to Mrs. Mary Jane Murray, at the address below.

WHITLOW
COMPUTER SYSTEMS Inc.



Call for your copy today!

Source Edp's *1977 Computer Salary Survey* is now available. This authoritative and up-to-the-minute report will allow you to compare your compensation directly with professionals across the country performing the same duties you perform. It also examines in detail the strategies and techniques thousands of successful computer professionals have used to enhance their careers. After fifteen years of recruiting experience, Source Edp knows how you can gain broader professional exposure, maximize your compensation and break into management. It's all in Source Edp's *1977 Computer Salary Survey* and career planning guide.

For your FREE copy, call the Source Edp office nearest you.

East		South/Southwest	
Boston	617/482-7613	Atlanta	404/325-8370
Greenwich	203/869-5977	Dallas	214/387-1600
Hartford	203/522-6590	Denver	303/773-3700
New York	212/736-7445	Fort Worth	817/338-9300
Philadelphia	215/665-1717	Houston	713/626-8705
Union, N.J.	201/687-8700	New Orleans	504/561-6000
Wash., D.C.	703/790-5610		
Wellesley, Ma.	617/237-3120		
Midwest		**West Coast**	
Chicago	312/782-0857	Encino, Ca.	213/995-8866
Oak Brook, Il.	312/986-0422	Irvine, Ca.	714/833-1730
Cleveland	216/771-2070	Los Angeles	213/386-5500
Detroit	313/352-6520	Oakland	415/444-5955
Kansas City, Mo.	816/474-3393	Palo Alto	415/328-7155
Minneapolis	612/544-3600	San Francisco	415/434-2410
St. Louis	314/862-3800	Seattle	206/454-6400
St. Paul	612/771-0544	Torrance, Ca.	213/540-7500

source edp

If unable to call, write:
Source Edp
Department C32
721 Enterprise
Oak Brook, Illinois 60521

(When writing, please be sure to indicate home address and current position title.)

SOUTHWEST PROG/ANALYST

HEATH CARE ENVIRONMENT
NCR CRITERION 8550
NEAT/3 COBOL
EXPERIENCE A PLUS

Equal Opportunity Employment
Send Resume To:
Woody Laughnan, Personnel Dir.
PROVIDENCE MEMORIAL HOSP.
2001 N. Oregon
El Paso, Texas 79902

Positions Available

Call toll free

800-426-0342

MARKETING REPS ....To 30K
Outstanding opportunity for professional with sales background to join a leader in distributed processing.

PROG/ANALYSTS To 20K
IBM 370/OS experience. Midwest location (not Chicago).

COBOL PROGRAMMERSTo 18K
Requires 2 years experience.

PARKER PAGE ASSOCIATES
P.O. Box 12308
Seattle, WA 98111
Offices: Seattle, Wash., D.C. Michigan, Atlanta

MIAMI/FLORIDA
Structured Prog. Mgr. to $27,000.00
Corp. Bus. ANal. to $27,000.00
Data Center Mgr. to $25,000.00
Sys.-Progs. IMS-CICS-OS to $24,000.00
Distribution Sys. Anal. to $22,000
IMS or Structured Prog. to $20,000.00
Ins. ANal.-CFO Issuecomm to $20,000.00
EDP Auditors to $20,000.00
Sr. Prog. & Analyst to $20,000.00
Submit Inquiries In Confidence To: AGA Assoc. Inc., 23 N.W. Lejeune Rd., Miami, Fla. 33126 (305) 541-2811

FIELD SERVICE ENGINEER

RESPONSIBILITY:

Perform preventative maintenance, emergency service and full component shop repair on Computer Network terminals, modems and controllers. Equipment includes but is not limited to: SANDERS, INCOTERM, CENTRONIC, VOGUE, SYNTECH, CC/MILGO, ICOT:

LOCATION:

Based in MINNEAPOLIS, Mn. with substantial travel over entire NORTH CENTRAL AIRLINES route structure.

QUALIFICATIONS:

Electronic repair training in trade school or military with experience on computer peripherals. Experience on any of the above listed equipment is desirable.

Send resume or contact: (612) 726-7545

PERSONNEL OFFICE
7500 Northiner Drive
Minneapolis, MN 55450

NORTH CENTRAL AIRLINES, INC.
An Equal Opportunity/Affirmative Action Employer

SYSTEMS DESIGN ANALYSTS

We offer opportunities to participate in the design and development of on-line transaction processing software. You would also be involved with software interfaces to data base management systems. Candidates would be working with a software development team engaged in transaction processing software development for the NCR Criterion processors utilizing VRX.

To qualify for these outstanding positions, candidates would have a technical or computer science degree. 4-6 years experience in software development projects is required. A thorough knowledge of operating systems, assembler language programming, and real-time concepts are among the qualifications you would possess.

PROGRAMMERS (Assembler Language)

We are seeking programmers with a technical or computer science degree plus 2-4 years programming experience. Programming experience will be in assembler language.

To investigate these oustanding opportunities write to:

NCR

Mr. Vernon L. Mirre
Corporate Executive & Professional Recruitment
NCR Corporation
Dayton, Ohio 45479

An Equal Opportunity Employer

position announcements | position announcements | position announcements | position announcements | position announcements

EDP CONSULTANTS

-San Francisco-

Outstanding career opportunities exist with the SAN FRANCISCO Office of an International "Big 8" CPA firm planning additions to its management consulting staff. Will require highly motivated EDP Professionals with exceptional problem solving ability.

These assignments require training or experience in the areas of:
- EDP Planning
- Automated Systems Selection
- Computer applications design, development & installation.

A high level of written and oral communications skills necessary for these challenging positions.

Please submit your resume with salary history, in full confidence, to Box 3172 this paper.

An equal opportunity employer

Inquire Programmer Analyst

Adria Laboratories, a fast growing, extremely successful ethical pharmaceutical firm has an outstanding career opportunity for a Programmer/Analyst.

Responsibilities will include: providing technical assistance to medical personnel to define data processing needs; use of Inquire to produce reports; and use of the Adria clinical system. Other responsibilities will include structuring an Inquire clinical data base, writing new programs to support clinical data processing and maintaining existing programs in the clinical system.

Requires minimum of 3 years data processing experience including working knowledge of Inquire. Knowledge of pharmaceutical research/clinical data processing preferred. This is an excellent opportunity to work in an environment that includes distributed processing and a large 370 computer.

Send resume including experience & salary history to:

Adria LABORATORIES INC

Gerald Brown
Adria Laboratories, Inc.
1105 Market St.
Wilmington, Delaware 19899

An equal opportunity employer, M/F

University of Cincinnati

SouthWestern Ohio Regional Computer Center (SWORCC) has several openings in EDP professionals in government contract applications.

SR. SYSTEMS PROGRAMMERS

For an AMDAHL 470 B/6 computer in a multi-vendor environment. Remote batch time-sharing services are supported under an SVS/HASP environment.

SWORCC has immediate openings for two Senior Systems Programmers with extensive experience in SVS/HASP systems. Experience should include generation, maintenance and modification of systems. Experience in ATS, CICS, coursewriting, or WILBUR is a definite plus. Some software monitoring and performance evaluation experience is desirable.

Excellent fringe benefit package. Resumes must contain desired salary range. Reply to Harold Crane, Personnel Manager, SWORCC, 3333 Vine Street, 5th Floor, Cincinnati, Ohio 45220.

An Equal Opportunity Employer

SYSTEMS PROGRAMMERS

Operating Systems Support

The Federal Reserve Bank of Boston seeks a systems programmer with Burroughs medium systems experience to assist in the enhancement and maintenance of vendor supplied software such as Operating Systems (MCVP), Spooling Utilities, Remote Job Entry Communication Frontend Software including Host Control Software, and to develop and maintain operationally-oriented programs in the following areas: Hardware malfunction detection and isolation; operator/MCP interface; computer to computer data transmission. Position requires B3500 or B4700 experience, a working knowledge of operating systems concepts; 2-5 years' experience in systems programming. Relocation expenses negotiable.

Please submit detailed resume including salary requirement to Ms. Sally Portle:

Federal Reserve Bank of Boston
30 Pearl St.,
Boston, MA 02106

Equal Opportunity Employer

computer hardware and software candidates RELAX

We have scores of openings in all parts of the U.S. Our fees are paid by hiring companies anxious to find qualified computer hardware and software candidates. Contact the nearest office for confidential service and let us do the footwork.

BRENTWOOD PERSONNEL ASSOC.
1280 Route 46
Parsippany, N.J. 07054
(201) 335-8700

D. BROWN & ASSOCIATES
Dorothy Spiegel DP Specialist
610 S.W. Alder, Suite 711
Portland, OR 97205
(503) 224-6860

AVAILABILITY, INC.
Data Services Consultants
5401 W. Kennedy Blvd.
Suite 285
Tampa, FL 33609
(813) 872-2631

COMPUTER CAREERS, INC.
Specialists-Data Processing
4720 Montgomery Lane
Suite 503
Bethesda, MD 20014
(301) 654-9225

members of
National Personnel Associates®
Specializing in DP

SAN FRANCISCO AREA DATA BASE SUPERVISOR

Community college district near San Francisco, now developing an on-line information system on a 370/138, offers excellent career opportunity as programming manager/data base administrator. Substantial experience required in developing DB/DC applications and in CICS-DL/1 system programming. Salary range: $20,100-$25,656, with excellent benefits. Write SMCCCD, 2015 Pioneer Court, San Mateo, CA 94403 or call (415) 574-6111 day or night for application form which must be returned by Monday, October 17. An Equal Opportunity Employer.

PROJECT MANAGER ANALYST/PROGRAMMER

for Commercial Minicomputer Applications

Expanding Northwest software firm has an opening for an individual with several years experience in minicomputer business applications. Position requires considerable customer contact together with systems design and programming. Knowledge of BASIC (preferably on WANG 2200 series) and accounting are essential. Qualified candidates are invited to forward resumes in confidence to:

P.O. Box 88067
Seattle, WA 98188

COMPUTER SALES KEY ACCOUNT MANAGER HOUSTON AREA

A well-known, fast growing computer manufacturer needs a person with successful sales background in distributed data processing, mini-computer terminals. Established territory-business is out there waiting.

For further information, contact Dot Chance at (713) 658-9898. All fees assumed by client companies.

M. DAVID LOWE
PERSONNEL SERVICES
403 Houston Nat. Gas Bldg.
Houston, Texas 77002

GROUND FLOOR OPPORTUNITIES

Kentucky's fastest growing corporation has immediate openings for qualified systems and programming personnel. New and expanded services to the banking industry have created additional positions at various levels ranging in salary to $20K+. If you are ready for a challenging career in a professional environment, please send your resume to:

METRIDATA COMPUTING, INC.

P.O. Box 21099
Louisville, KY 40221
Attn: C. Stuart Riley

PROGRAMMER ANALYSTS

Two Positions

Leasing pharmaceutical company in Eastern North Carolina has immediate openings for two individuals with 3-5 years experience in a COBOL environment. Applicants should have 5 years programming experience, a manufacturing or commercial systems background, IBM 360/370 systems experience, and be capable of working closely with user personnel. Experience in TOTAL, CICS, or Assembler is a definite plus. Excellent opportunity for an experienced programmer seeking career advancement.

WE OFFER:
Good starting salary
Comprehensive benefits including paid life and family medical insurance
Paid retirement and relocation plan

For prompt consideration, send resume in confidence including salary history and requirements to:

Employment Supervisor
Mr. W.C. Faulkner
BURROUGHS WELLCOME CO.
PO Box 1887
Greenville NC
27834

An Equal Opportunity Employer M/F

Wellcome

Logistics Manager

San Francisco Peninsula

Outstanding business growth has created the need for an experienced Logistics Manager in our field engineering organization.

The individual we seek will have experienced the design and implementation of multi-tiered spare parts inventory control and ordering systems, be thoroughly familiar with order formulation, forecasting techniques, inventory accounting concepts, and successfully managed a logistics operation, preferably in a Field Engineering environment.

We offer stimulating challenge, rapid business growth, high visibility, and a competitive salary and benefits package. Interested candidates should send their resume with salary history to Manager, Professional Staffing, FOUR-PHASE SYSTEMS, 10700 North De Anza Blvd., Cupertino, CA 95014. Refer to 4101. Equal employment opportunity is our pledge & practice.

Four-Phase Systems
Advanced Technology for Distributed Processing

Computer Maintenance Engineers

DEC-PDP/10 Systems

Join Tymshare — the Growth Company in Computer Services where opportunity for Experienced Professionals means:

- Immediate Openings In: COLORADO, NEW JERSEY, TEXAS and CALIFORNIA
- Responsible self-supervised enviroment
- You get in on the "Ground Floor" of Tymshare's fast-growing third-party maintenance organization
- Advancement to suit your goals management, technical and software

WE should get together if you are a capable, self-starter with the following qualifications.
- Minimum of 1-3 years' maintaining PDP/10 KA, KI, or KL Systems
- Ability to interface extensively with Data Processing Managers while maintaining their equipment

All positions offer an excellent salary and great company benefits. To arrange for your confidential local interview
CALL COLLECT Mr. Dick Royal (408) 446-6672

TYMSHARE® INC.
an equal opportunity employer m/f

10231 Bubb Road
Cupertino, CA. 95014

position announcements | position announcements | position announcements | position announcements | position announcements

COMPUTOR ANALYSTS

The State University of New York at Buffalo is accepting applications for positions on its computer center staff.

Chief Applications Analyst

Applicants should have at least a Bachelor's Degree in the sciences and a minimum of two years of computing experience. A thorough proficiency in programming and analytical techniques must be demonstrated. The incumbent should have considerable experience in software development and usage and also provide contributory expertise in selected areas of computer applications, particularly statistics. The ability to interface with systems is desirable.

Responses to Richard Brow, Manager of User Services, by November 1.

Systems Analysts

Applicants should have an undergraduate degree, 2-4 years experience with a large scale computer facility, be competent in COBOL, and have strong oral and written communication skills. The positions require system design and analysis responsibilities for administrative applications at a major university. Data base design experience highly desirable but other candidates may be considered. The applicant should be familiar with techniques for analysis, systems design, and project planning and control.

Responses to James Carrier, Director of Administrative Computing, by October 15.

The Buffalo area offers various cultural services such as a Philharmonic Orchestra and Live Theater, plus a wide variety of winter and summer sports including excellent skiing and sailing. Successful applicants may expect highly competitive salaries and excellent fringe benefits, as well as eligibility for future tenure. Send resumes in confidence attention of the above at:

SUNY/BUFFALO
University Computing Services
4250 Ridge Lea Road, Box No. 46
Buffalo, N.Y. 14226

An Equal Opportunity/Affirmative Action Employer

SENIOR PROGRAMMER

The Manitowoc Company, Inc., a world leader in the manufacture of large crawler mounted cranes is currently involved in the development of a communications network in a data base environment to support a 35 million dollar expansion program.

As a result, we have a challenging position for an individual with a minimum of two years experience using PL/I in a DOS/VS environment along with a working knowledge of DOS JCL CICS & PANVALET, experience desirable but not required. Duties include all activities from assisting in design through programming documentation and implementation. Individual will become involved in the guidance and development of programmers and programmer trainees.

Position offers salary based on experience as well as a full range of benefits including a lucrative profit sharing plan. We are located in a pleasant lakeshore community with a wide range of cultural and recreational activities.

If interested, send resume with salary history to: Tom Musial, Personnel Department.

THE MANITOWOC COMPANY, INC.
500 So. 16th Street
Manitowoc, Wis. 54220
An Equal Opportunity Employer

CORPORATE SYSTEMS MANAGER

Congressional Information Service, rapidly-growing private publisher of abstracts and indexes and microfiche full-text documents, requires an analytic, innovative individual to promote and manage effective integration and explotitation of newly acquired inhouse Eclipse C-330 minicomputer, in coordination with existing applications on IBM 360.

Responsibilities will require sound technical judgements and creative systems designs over a broad range of application areas, including text processing and publishing, market analysis, accounting, management information, order fulfillment, and microfiche manufacture. Duties will also include evaluation, selection, and oversight of computer hardware, software, and services purchases.

The person we are seeking is service and support oriented, is highly cost and quality conscious, and has a track record of completing difficult projects. Background should include minimum three years programming and an additional five years systems management experience in relevant application areas, most preferably in information publishing.

We offer a competitive salary, a dynamic atmosphere, and excellent benefits. Please reply in confidence, including salary history, to Lawrence Parkus, Vice President and General Manager,

CIS
CONGRESSIONAL INFORMATION SERVICE
7101 Wisconsin Avenue
Bethesda, Maryland 20014

An Equal Opportunity Employer

SUNBELT OPPORTUNITIES

Over 30 professional openings for DP Sales Managers, Project and Product Consultants. Prefer P&C, Life, or Pension experience. Salaries $22-$30K.

Employer Retained

ipr
INSURANCE PERSONNEL RESOURCES, INC.
2970 Peachtree Road, N.W. • Suite 622
Atlanta, Georgia 30305 • (404) 262 2972

PROGRAMMER ANALYST

Bachelor's Degree (Master's preferred) in Computer Science, Mathematics, or Statistics and minimum of 2 years of FORTRAN programming experience required. Completed applications must be received by Oct. 17, 1977. To obtain an application form, please write to: Personnel Department.

BURLINGTON COUNTY COLLEGE
Pemberton, N.J. 08068
An Equal Opportunity Affirmative Action Employer W/M

FLORIDA MIS MGR

Fortune 500 Co. looking for exp Mgr with heavy mini bkgd prior prog exp req — must Data Base & TP network exp. Hospital lab experience helpful. Degree req Fee & relocation Paid to 23K.

ROBERT HALF PERSONNEL AGENCIES
1311 N. Westshore Blvd.
Tampa, Fl 33607
(813) 876-4191

SYSTEM/ PROGRAMMER

Recent experience with IBM 370, DOS/VS, PWR/VS, CICS/VS. Must be proficient in IBM Assembler. Closing Date: 9-30-77; Position #214 Contact Classified Personnel.

San Jose Community College District
4750 San Felipe Road
San Jose, CA 95121

An Affirmative Action/Equal Opportunity Employer and "In Compliance with the Requirements of Title IX."

FLORIDA SUNSHINE AND $$

Several career positions available for Data Processing Professionals.

CICS Appli. Pgm/Anal	$19K
Prog/Anal	$19K
370 Intern-Sys Gen	$24K
MIS Consultant	$26K
IMS Progs	$22K
Anal-PDP-11 RSX-11	$24K
Banking Progs	$16K
DP Opers. Mgr.	$24K
Comm. Spec. CommTen CICS	$18K

Submit resumt with current salary or contact:

Frank Leonard Personnel
1211 N. Westshore Blvd.
Tampa, FL 33607
(813) 872-1853

BIG WONDERFUL WYOMING EXCELLENT OPPORTUNITY

PROGRAMMER ANALYST. On-line experience required. IBM 370 and System 3/Model 15 experience preferred. B.S. Degree. Send resume to: DATAMAN corporation, 1807 Capitol Avenue, Cheyenne, Wyoming 82001.

PROGRAMMER/ ANALYST

Small Company located in the Fox River Valley area of Wisconsin is looking for an experienced programmer/analyst. Must have 2-3 years experience in manufacturing and financial systems. RPG II programming necessary with knowledge of distributive systems design helpful. Excellent growth potential to D.P. Manager available to the right person. Please send resume in confidence to:

CW Box 3173
797 Washington St.
Newton, Mass. 02160

PROGRAMMER/ANALYST

The client, company location and working environment are excellent. The qualified candidate should have a min. of one yr. programming experience. Dynamic IBM atmosphere, excellent salary and benefit package. Other positions available in metropolitan or rural areas. Relocation and fee paid. Contact Rich Haney for more details.

ROBERT HALF PERSONNEL AGENCIES
2236 IDS Center
Minneapolis, MN. 55402
(612) 339-9001

COMPUTER DESIGN & DEVELOPMENT

Software Engineers

Qyz, a rapidly expanding division of Exxon Enterprises, Inc. is seeking qualified individuals who would like to participate in the growth of a new information systems business. We are looking for ambitious professionals who are willing to work hard for high rewards in a fast moving shirt sleeve environment.

We presently have opportunities available for Software Engineers with one to five years experience in the following areas:

- Structured Software Design & Development
- Block-Structured, High-Level Language Programming
- Assembly and Macro Language Programming
- Real Time and/or Systems Programming
- Mini and Micro-Computer Systems

BS/MS in Computer Science or equivalent preferred. Send resume and salary history to: Qyx, Division of Exxon Enterprises, Inc., Dept. MH, P.O. Box 429, Exton, PA. 19341.

Qyx™
Intelligent Typewriter Systems
A Division of EXXON Enterprises Inc

We are an equal opportunity employer, m/f

Systems Programmers

Two Systems Programmers. One relatively junior with experience in PL/1, design and installation of computer measurement and accounting systems, knowledge of other programming languages; i.e., Assembler and SAS, and IBM large scale operating systems (OS or VM). The other more senior level requires experience in performing computer requirement studies, designing and installing integrated computer systems applications, experience as project leader and knowledge of IBM large scale operating systems (OS or VM), mini and micro computers mainly from a planning and coordination standpoint, and knowledge of data communication and computing networks.

Programmer Analysts

Senior programmer to work on the development of a large on-line library automation system (BALLOTS). The primary work will involve development of bibliographic data base systems to support library operations. Demonstrated skills in design and programming of information retrieval and/or data base management systems in a TYMSHARED environment is required. Approximately three years experience plus a BS in computer science or related field and/or equivalent combination of experience and education is desired.

Senior Communications Design Engineer

To design and implementa data communications system to connect a large network of terminals to the BALLOTS library automation system. The communications system will support nation-wide networks of polled multi-drop lines to intelligent terminals, direct connections among mainframes, and direct dial or VAN access for dumb terminals. Applicants should have a BS in EE, Computer Science or closely related fields, and a minimum of three years experience demonstrating technical knowledge of both hardwareand software aspects of data communications and understanding of common carrier services, or equivalent combination of education and experience.

Send resume with salary history to: Stanford University, Center for Information Processing, c/o C.W. Coulter, Encina Hall, Room 30, Stanford, CA 94305.

STANFORD UNIVERSITY

Equal Opportunity Employer
Through Affirmative Action

position announcements | position announcements | position announcements | buy sell swap | buy sell swap

PROGRAMMER ANALYST

Departmental expansion has created an excellent opportunity to join a progressive insurance organization in the Pacific Northwest. The successful candidate will have a minimum of 3 years heavy exposure to Life/Health insurance system design. Sys/3 RPG II, CCP and telecommunications experience helpful. Responsibilities will include the design and implementation of on-line data base and management information systems.

Salary range $14K-18K. Excellent benefit program. Please submit resume, including salary history to P.O. Box 3174, 797 Washington St., Newton, Mass. 02160.

SENIOR ANALYST

Ball State University is looking for a senior analyst who can assist users in solving highly technical systems problems. BS in computer science with 3 years experience required. Excellent fringe benefits, educational opportunities. Starting salary to $17,200. Application deadline: 10/7/77.

Send resume to:

BALL STATE UNIVERSITY
Personnel Services Office
Muncie, IN 47306

An Equal Opportunity/Affirmative Action Employer

Mississippi State Central Data Processing Authority

Sealed proposals will be received by the CDPA, 508 Robert E. Lee Bldg. Jackson, MS 39201, up until 2:00 p.m. 10-17-77 for the following data processing equipment:

Request for Proposal No. 319 for the acquisition of a data processing facilities management service contract for the State of Mississippi Central Data Processing Authority

Detailed specifications may be obtained from the CDPA office. The CDPA reserves the right to reject any and all bids and proposals and to waive informalities.

Clyde P. Ballard
Executive Director

PROGRAMMER ANALYST

Outstanding opportunity for exceptional person with extensive data base programming experience. Project oriented, highly organized individual will have support and proper environment for production. No D.P. shop supervision involved. A growing company in the beautiful Texas hill country will allow you to live and work in a suburban atmosphere. Send complete resume to:

A. Mitchell
P.O. Box 755
Kyle, Texas 78640

SYSTEMS PROGRAMMER

Needed by local County govt. to develop, install and maintain systems related to IBM 370 COS/VS environment using CICS/VS. Requires HSG or equivalent supplemented by standard programming courses plus 3 yrs. programming experience using ALC, COBOL and RPG; 6 months of which must be as systems programmer with virtual storage/teleprocessing operating systems and file maintenance software. Entrance salary commensurated with education/experience.

All resumes must be accompanied by a completed Co. app. and received by Sept. 7, 1977. Apply to
Arlington County Personnel Dept.
2100 N. 14th St.
Arl., Va. 22201
Affirmative Action Employer

FOR SALE
"DATA PROCESSING"
Computer Equipment
Available Good Condition
Four Years Young

- **Model 620/L-000 Varian CPU with Cabinet**
- **Centronics Line Printer E-2200 165 CPS**
- **Teletype ASR-33 Model 620-06**
- **Card Reader 620-25**

NO REASONABLE OFFER WILL BE REFUSED
Contact N.E. Hospital Purchasing Mgr. Mr. H.A. Zawila
Direct Phone 215/427-6353

CDC 6600 6400
Sale or Lease

COMPUTER LEASING COMPANY

John M. Hallmark
(214) 233-1818

BUY SELL SWAP

OPERATING LEASES
3, 4, 5 YEAR WALKAWAYS
– NEW OR USED 370'S
– MEMOREX PERIPHERALS

MACHINE AVAILABILITY
– 138/148/3033 ON ORDER POSITIONS
– 135/145/155 PORTFOLIO

ICD CORPORATION

17 Sherwood Pl. Greenwich, CT 06810 — Dick St., Francis 203/661-2904
3301 Woman's Club Drive Raleigh, N.C. 27612 — Dean Painter 919/787-9085
700 E. Maple Birmingham, MI 48011 — Ed McKelvey 313/645-1462
Bruce Dunlap 415/490-1575 — **2 Palo Alto Sq. Palo Alto, CA 94304**

WANTED BUY OR LEASE 360/30F-65K
1403/N1 Printer System
2311 Disk System (5)
2401-2 Tape System (2)
Card Read/Punch Unit
60-90 Days

COMPUTER UTILITIES OF ORLANDO
P.O. Box 14144
Orlando, FL 32857
(305) 894-8113

3277-Mod 2 CRT's
FOR SALE

3 Available Immediately
On-Order Schedules
Available Dec. and Feb.

Contact Don Miller or Bill Behrens
(817) 244-4440

FOR SALE

	Serial #'s
3211-1 Printer	11879
3811-1 Controller	11888
1403-N1 Printer	36235
2821-2 Controller	50185

Available for Sale December 1977

WESTERN MARKETING AND FINANCIAL
(415) 526-9221
(312) 871-7330
Fred Hegeman **Jack Air**

FOR SALE
CALCOMP
225 Disk Drives with Diva Comptroller and one Interface for a PDP 11/45 Six Calcomp 225 Disk Packs.

Contact: T. Monaghan
Zipatone Inc.
150 Fencl Lane Hillside, Il. 60162
(312) 449-5500

360 - D O S
TIME AVAILABLE
SUBSTANTIALLY REDUCED RATES
CALL RON PISANO
212-349-6000

FOR SALE
I.B.M. 370/138
1 MEGABYTE
AVAIL. NOV. 1977
CALL: TOM FURTAK
(714) 232-4011

NASSCO
P.O. Box 80238
San Diego, CA 92138

IBM 3033
Available Early Summer, 1978
Various Lease Terms

CW Box 3178
797 Washington St.
Newton, Mass. 02160

IBM 3275 REMOTE CRT'S
- **Immediately Available**
- **Choice of Keyboard**
- **Large Screen**

Write or Call
TERMINAL LEASING COMPANY
919 N. Michigan Ave.
Chicago, IL 60611
(312) 943-3770 Telex 25-5161

SALE OR LEASE
(by user)
Available December 1977

NCR CENTURY 101

615-101	32K	CPU
682-101	300 CPM	Card Reader
657-102	60 MBYTE	Disc & Controller
646-201	1200 LPM	Train Printer
(2) 796-101		CRT Terminal

Contact:
David H. Goldner, Cliffside Office Supply Corp.
45 East Wesley St., South Hackensack, N.J. 07606
201-488-4200 Ext.21

FOR LEASE OR SALE
PDP 11/70 11/34 Systems
Contact: Roy Nicolosi
(201) 843-5300
National Data Systems, Inc.
299 Market St.
Saddle Brook, N.J. 07662

DIGITAL EQUIPMENT COMPUTER DS 310-16KB
Dual Floppy Disk with CRT and Printer
Less than one year old
Payroll, General Ledger and Accounts Payable
Software Package can be included
FOR SALE OR LEASE
Call or Write
EATON FINANCIAL CORP.
150 Speen St.
Framingham, Mass. 01701
(617) 235-0733

SALE
System 3, Mod. 10 16K, 1-5444, 5424, 5203, 5410

No Brokers
Principals Only
Call
Jack Boates (617) 344-1111
Franklin Sports Industries, Inc.
17 Campanelli Parkway
Stoughton, Mass. 02072

FOR SALE OR LEASE
- **370/145 Serial Number 10395**

Available Immediately
Will reconfigure to your spec's
- **3830/2 Disk Control - 12/1/77**
- **3420/3 SD-Qty. 7 – 10/10/77**
- **3420/3 DD Qtv, 3 – 10/10/77**
- **3330/3333 Model 1&11 - Nov/77**

WANT TO BUY
- **3420 – Any Model**
- **3803 – Any Model**
- **3340 – Any Model**
- **3270 Equipment**

Call or Write
FORSYTHE/McARTHUR ASSOC., INC.
919 N. Michigan Ave., Chicago, IL 60611
(312) 943-3770 **Telex: 255161**

FOR SALE
DEC
*** 310 DATASYSTEMS**
(Used Only)
*** 324 DATASYSTEMS**
New Only
*** RK06 Drives & Controller**
*** Dual Floppy Disc Drive**
New

COMPU-SHARE, INC.
Lubbock, TX
3824-50th
806-792-3785

C. E. I. B.
"The world's largest used computer listing service"

***MULTIPLE-SOURCE LISTINGS - CEIB's listings represent the largest pool of used computer equipment in the world - over 6,000 current offerings from more than 500 brokers, dealers, and private sellers - from 370/168s to minicomputers, terminals, accessories, and unit record equipment.**

***BUYERS - Contact CEIB today for free, up-to-date information on any specific listings you are interested in - or write for our comprehensive new monthly catalog ($3/issue or $25/yr, ppd.)**

***SELLERS - CEIB provides a very convenient, inexpensive approach to locating potential buyers. If you haven't already received our brochure and listing forms, please write or call . . . . .**

CEIB - PO Box 163; Boston, Mass. 02117 - (617) 247-2290 - R. Ferrara, President

buy sell swap | buy sell swap | buy sell swap | buy sell swap | buy sell swap

138's, 148's AVAIL
DEC, JAN, FEB
LEASE or SALE

BARRETT
CAPITAL
& LEASING
CORPORATION
14 Redwood Road
White Plains, N.Y. 10605
(914) 761-0070

MAGNETIC TAPE SALE

Slightly used, Money-Back Guarantee
U.S. Government Archives
Manufactured to G.S.A. Specs!

2400' 1600'bpi/3200fci
w/Hanging Seal $4.50 ea.

Freight prepaid on orders over 200 Tapes. Shipped within 48 Hrs.
CALL or WRITE:
Computer Tape Mart
31-Sprague Ave., Amityville, NY 11701
(516) 691-2309
(Brokers Inquiries Welcomed)

FOR SALE
15 DEC 11/04 SYSTEMS with:

- 24K words MOS memory
- RX11BA dual floppy disc drives
- 3-DL11D; 1-DL11WB
- 1-DULLDA
- also: BA11B, BA11KE, DD11B
  all in H960CA cabinet
  9 never installed-6 used also available
- new 3-TJU16EA tape drive
- used 2-TU10EE

G. Iken
DATAFLO SYSTEMS
(an Equifax Company)
P.O. Box 4261
Atlanta, GA 30302
(404) 325-5969

CONTINENTAL Information Systems

BUY, SELL, LEASE, SUBLEASE, AND TRADE
New and Pre-owned IBM Equipment

FOR SALE
165, DAT optional
168 AP
168-3

WANTED
158
MOD 1 and 3

Bill Pomeroy

Also Available Now
on short term lease
360/50, 370/135,
and 370/155 II

Fred Cholette John Humic

CIS
CIS Corp.
600 MONY Plaza
Syracuse, NY 13202
315-425-1900 Telex 93-7435

SALE
DECprinter I Model LA 180
HIGH SPEED PRINTER
$2,850.00 ea.
Complete with EIA
Serial I/O Interface
$2,500.00 ea.
You provide interface
Full DEC Warranty
Terms:
Two weeks ARO
F.O.B. Park Ridge, Ill.
CASH WITH ORDER

Also available: LA 36, LS 120, VT 52, 1103, Diablo 1620, Cassette & Floppy systems, TI 745, TWX/DDD Alternates, TTY-43 & Couplers.

MANAGEMENT
RESPONSE CORP.
660 Busse Hwy.
Park Ridge, IL. 60068
(312) 698-3377
IN WATS (800) 323-2135

FOR SALE/LEASE
DEC LSI 11®
PDP 11V03 SYSTEMS
LA 36 DECwriters
LA 180 * VT 52
In Stock For
IMMEDIATE DELIVERY
Call: Glenn Burnett

UNITRONIX CORP.
1081 U.S. Hwy 22
P.O. Box 6515
Bridgewater, N.J. 08807
(201) 725-2560

NEW LOW PRICE
Computer with:
FORTRAN IV or MULTIUSER BASIC

LSI-11 in a desk
56K bytes MOS RAM
RXV11 Dual Floppy Disk
with REV-11A boot
VT52 DECscope
LA180 DECprinter
all interfaces, cables
RT-11 operating system
complete: $15,900
2nd Dual Floppy $3600
add. VT52 & IF $1995

100 PLUS Corp.
701 Trinity St.
S. Plainfield, N.J. 07080
(201) 753-4460

Surplus DEC And Data General Hardware For Sale
PHIL THOMAS (305) 272-8753
Thomas Business Systems, Inc.

BUY-SELL TRADE
For Computer
Call Action Write
CAC
404/458-4425 P.O. Box 80572 Atlanta, Ga. 30366

BUY·SELL·TRADE IBM EQUIPMENT
IBM 360/50 Core for Sale
Data Recall: 256 to 384KB
Itel (AMS): 256K to 512K
IBM: H to HG, H to I and HG to I
Standard Memories: 256 to 512K,
512 to 768K and 512K to 1Meg
CALL DICK BAKER (305) 561-5207
dataware incorporated
Intracoastal Building
3000 NE 30th Place, Suite 309
Fort Lauderdale, Florida 33306
Telephone (305) 561-5207
MEMBER CDA

PROFESSIONAL DEALER/LESSOR OF IBM COMPUTER SYSTEMS
Bob Russell
Jack Emery
Dave Hepburn
Paul Baillie
SYSTEMS MARKETING, INC.
200 E. Thomas Road
Phoenix, Arizona 85012
(602) 264-5600 Telex 667-334
SMI

wanted
DISC PACKS
DATA MODULES
All Types Required
Call Lorraine
(312) 421-2900

Wanted to buy System 3/10 or 3/6
Principals only. No brokers.
Call
Rotor Clip Company
(201) 469-7333
187 Davidson Ave.
Somerset, N.J. 08873

---IBM 158---
We are going to purchase a 158½ Meg-4 Channel for January delivery. We will purchase from submitted offers. If you have the equipment and really want to move it, send your best cash price the first time to:
Preferred Municipal Funding
5586 S. Emporia Circle
Englewood, Colorado
(303) 773-1757

WANTED
ALL 360/370 SYSTEMS AND SYSTEM/3
AND PERIPHERALS
WE BUY · SELL · LEASE · TRADE
transdata
Member Computer Dealers Association
P.O. Box 47762 Dallas, Texas 75247 PHONE (214) 631-5647

DEC
VT05 CRT
WITH
PDP8 INTERFACE
$2500.00
LA180 PRINTER
$2800.00
RK05J DISK DRIVE
$4500.00
R. LABAR & ASSOC., INC.
2750 Northaven Road
Dallas, TX 75229
(214) 243-3451

BUY — SELL — LEASE — BROKERAGE
Let the
"NATIONS LARGEST WHOLESALE DEALER"
Buy, sell, lease, sub-lease, or be your agent in placement of your pre-owned IBM 360/370/System 3, or other units
COMPUTER INTERNATIONAL, LTD.
CWC's international division —
experts in foreign markets, freight, customs
BEACH COMPUTER CORPORATION, CWC's Leasing Division
COMPUTER WHOLESALE CORP., (504) 581-7741
SUITE 507/508 FIRST NATIONAL BANK OF COMMERCE BLDG.
NEW ORLEANS, LOUISIANA 70112
MEMBER OF COMPUTER DEALERS ASSOCIATION

first class
permit no 40760
newton ma

BUSINESS REPLY MAIL *no postage stamp necessary if mailed in the United States*

postage will be paid by

COMPUTERWORLD

CIRCULATION DEPARTMENT

797 Washington Street
Newton MA 02160

Detach here, moisten and seal envelope securely before mailing.

Fold and insert order form (attached through binding) and remittance here.

USE THE ATTACHED ORDER FORM AND THIS ENVELOPE FOR:

- ☐ *a new subscription*
- ☐ *new address*
- ☐ *new title*
- ☐ *new industry*

Order form is attached through binding. Be sure to include current label or label information when making a change.

buy sell swap | buy sell swap | buy sell swap | buy sell swap | buy sell swap

IBM UNIT RECORD EQUIPMENT

MACH.		LEASE	MACH.	SALE	LEASE	MACH.	SALE	LEASE
024	$ 300	$20/Mo.	083	$1800	$60/Mo.	526	$1400	$70/Mo.
026	$ 900	$35/Mo.	084	$2500	$100/Mo.	548	$1600	$70/Mo.
029	$1900	$55/Mo.	085	$1200	$60/Mo.	552	$1000	$40/Mo.
046	$1200	$50/Mo.	088	$2500	$175/Mo.	557	$3000	$100/Mo.
047	$1500	$60/mo.	402	$1000	$60/Mo.	Disc Packs		
056	$ 200	$15/Mo.	403	$1200	$70/Mo.	2316	$ 89	$5/Mo.
059	$1400	$50/Mo.	407	$1500	$80/Mo.	3336(1)	$ 129	$10/Mo.
077	$ 450	$25/Mo.	514	$ 800	$45/Mo.	3336(11)	$ 199	$15/Mo.
082	$ 850	$35/Mo.	519	$1000	$55/Mo.	3348(70)	$ 950	$40/Mo.

THOMAS COMPUTER CORPORATION
600 N. McClurg Court - Suite 4202
Chicago, Illinois 60611
(312) 944-1401

BURROUGHS * BURROUGHS
FOR SALE OR LEASE
B500 SYSTEM
(OR PERIPHERALS)
AVAILABLE
19.2K CPU, (2) MTU's (7 TRACK), 800 CPM READER, 1100 LPM PRINTER, (3) MODS DISK W/CONTROLLER, SPO, AVAILABLE IMMEDIATELY! ALSO, (3) MDS-1101 DATA RECORDERS
FINANCING ARRANGED
CONTACT:
MARK C. FIELDS
DESIGN DATA
175 Maple St.
Marlboro, MA 01752
(617) 481-5005

IBM SYSTEM/3 - 10
Distress Situation

		IBM List	
5410-A14	Processing Unit, 16K	$20,910	
3971	5203-2 Attachment	2,050	
4100	5424-A1 Attachment	3,470	$24,950
4110	5471 Attachment	2,315	
6378	2nd Disk Attachment	1,965	
5471-1	Printer-Keyboard	3,885	
5424-A1	Multi-Function Card Unit	7,810	
5203-2	Printer, 200 lpm	9,185	
5560	36 Add'l. Print. Pos	1,750	
5444-2	Disk Storage Drive	7,515	
5444-2	Disk Storage Drive	7,515	
		68,370	
5496-1	Data Recorder	5,935	5,500
5496-1	Data Recorder	5,935	or 28,950
		77,925	for all

Available NOW - IBM Maintenance
CMLS Listing # A-423
One-of-a-Kind — Subject to Prior Sale
Call the Computer Multiple Listing Service Broker Nearest You:

Annapolis	301-267-6600	Detroit	313-559-5140
Atlanta	404-434-1382	Miami	305-844-4323
Birmingham	205-595-4374	Minneapolis	612-474-8873
Boston	617-332-2637	Minneapolis	612-854-8380
California	213-887-1040	Memphis	901-761-2766
Charleston	803-556-6232	Nashville	615-297-5106
Chicago	312-392-6600	New Jersey	609-737-2754
Dayton	513-224-0222	New York	518-563-0343
Denver	303-399-3666	South Bend	219-232-7921

or call C M L S Art Phinney 703-560-8350

370/125's
For Sale* Lease* Purchase
****Purchase Leaseback***
Specialists in 125 Systems
CORPORATE COMPUTERS, INC.
(203) 661-1500 *Member CDA*
115 Mason St., Greenwich, CT 06830

★★★ BEST BUY★★★
NCR CENTURY 100
in excellent condition
to dispose of immediately.
Purchase includes:
32K Memory
Dual 655's
I/O Writer
(20) 655 Packs
300 CPM Reader
450/900 LPM Printer
— ALL FOR $8,000 —
Call:
Florida Software Services
(305) 831-3001

SHORT TERM LEASES

370/168	370/155
370/165	370/145
370/158	370/135

- ☐ Lease directly from CSA's existing portfolio.
- ☐ Guaranteed upgrade to larger models when required
- ☐ Broker and dealer referrals are welcomed and protected.
- ☐ Please call collect: (617) 482-4671
  Marilyn Glazer

Computer Systems of America, Inc.
141 Milk Street, Boston, MA 02109

WANTED
IBM 954
Facsimile
Posting Machine
Heat transfer Model 2
Must be in good condition
Write or Call:
MILES KIMBALL CO.
41 West Eighth Ave.
Oskhosh, WI 54901
Attention:
Harold Gottgetreu, Mgr EDP
(414) 231-3800

AVAILABLE FOR LEASE
System 3(B18)
Tape & Disk
Available November 1
Lease With Options
Write or call:
COMPUTER INDUSTRIES INC
3570 American Drive • Atlanta, Georgia 30366
404/451-1895 • TWX 810/757-3654
CHICAGO WASHINGTON LOS ANGELES

MISSISSIPPI STATE
CENTRAL DATA PROCESSING AUTHORITY

Sealed proposals will be received by the CDPA, 508 Robert E. Lee Bldg., Jackson, MS 39201, up until 2:00 p.m. 10-17-77 for the following data processing equipment.

Request for Proposal No. 311 for the acquisition of keyboard activated data communication terminals: 311A-ASR and KSR hard copy terminals, 311B-TTY compatible CRT terminals, 311C-Printer devices for receive only, 311-D graphics terminals, 311E-IBM compatible CRT's, controllers, and printers, This RFP will be used to select terminals for the State of Mississippi until June 30, 1978.

Request for Proposal No. 312 for the acquisition of the IBM MVS/System Extensions or an equal or better software product.

Request for Proposal No. 313 for the acquisition of a job accounting system to operate under MVS.

Request for Proposal No. 314 for the purchase of a disk-oriented computer system with multi-processing capabilities, cardless with up to 12 data entry stations to be used in a small college environment.

Request for Proposal No. 315 for the lease or purchase of printing interpreting keypunch-verifiers

Request for Proposal No. 316 for the lease or purchase of data entry devices utilizing diskette recording media and capable of interfacing with an existing IBM System 3 Model 10.

Request for Proposal No. 317 for the purchase of a disk drive to attach to an existing IBM System 3/10 with one existing 5444 Model 2 drive. Must have a capacity of 4.9 million bytes minimum.

Request for Proposal No. 318 for the upgrade of an existing IBM System 3/10 from 16K bytes of memory to 32K bytes of memory, to upgrade a 5444 Model 1 disk drive to a Model 2, to upgrade the System 3/10 to a dual programming machine capable of loading and processing 2 programs simultaneously.

Detailed specifications may be obtained from the CDPA office. The CDPA reserves the right to reject any and all bids and proposals and to waive informalities.

Clyde P. Ballard, Executive Director
Central Data Processing Authority

WANTED TO BUY
370/135 HO
Desire February Delivery
CW BOX 3175
797 Washington Street
Newton, Mass. 02160

FOR SALE
NCR 315 SYSTEMS

Qty	Type	Descrip.
2	315	RMC Proc.
4	316	20K Mem.
2	340	Printr.
3	353-1	CRAM
12	333	TAPE
1	360	C.R.
1	354	C.P.B.

NATIONWIDE INSURANCE
Attn: Data Processing
One Nationwide Plaza
Columbus, Ohio 43215
(614) 227-6606

WANTED
One good condition Nova 1200 Jumbo with 32K core, I/O controller and CPU. Power monitor and auto load desirable. If available would also buy 10 Mbyte disc (SM fixed, SM removable) and controller to be used with Nova 1200.

Contact Tech. Director
TELEDYNE GEOTRONICS
Long Beach, CA
(213) 435-8326 Telex 656412

IBM 158 Attached Processor
AVAILABLE NOVEMBER 15
IBM 370/145IH2
AVAILABLE JANUARY 1
Contact: Jerry Borisy
JBI ASSOCIATES, INC.
445 Union Blvd., Suite 303
Lakewood, Colo 80228
(303) 988-0820

---

370 135 FE
FOR LEASE
BY DON COMPANY
Fully Loaded
IPA, ICA, IFA, 25EL CH.
2 or 3 year lease
Available Oct. 15
Call
George Nason
312/442-9400

AVAILABLE FOR LEASE
370/145 ½ meg
Month-to-Month Term
with 180 day cancellation $7700/mo.
Contact: Don Blough
The Gap Stores, Inc.
875 Mahler Road
Burlingame, Ca. 94010
Tele: (415) 692-5450 X240

For Sale Or Lease
System 3/15
Complete Systems
Any configuration from B 19 to D 24
30 to 90 days delivery depending upon your requirements.
Also complete inventory tapes — disks.
Printers — CPU Upgrades

Call Avery Reynolds 214-630-6700
TWX 910-861-4936

PCM Pioneer Computer Marketing
1165 Empire Central
Dallas, Texas 75247
Member of Computer Dealers Association

buy sell swap | buy sell swap | buy sell swap | buy sell swap | buy sell swap

FOR SALE OR LEASE
360-65
MODELS H, I, IH & J
AVAILABLE NOW
THRU DECEMBER 1977
Each with 2860-3,
2870-1, 1052-7
360-501
Features 3274, 6980, 6981, 7920
Available October 1977
CALL: BILL RUMMLER
(612) 884-3366
Centron Computer Corp.
8120 Penn. Ave. South
Minneapolis, Minn. 55431

370/145
AVAILABLE TODAY
1-5 Year Lease
256K, 4-Channel
Tom Robbins
Computer Properties, Inc.
7710 Computer Avenue
Minneapolis, Minn. 55435
(612) 831-6088

BUY
SELL
LEASE
Peripherals & I/O

3330's	3410's	3211's
3340's	3420's	3505's
3350's	2401's	1403's
2314's		2501's

Gene Chappell
CIS
CIS Corp.
600 Mony Plaza
Syracuse NY 13202
(315) 425-1900
Telex: 93-7435

GO GREYHOUND

WHEN BUYING OR SELLING COMPUTER EQUIPMENT

For Sale	Want to Buy
370/145 H2	IBM 3803-1 and 8 3420-7's
360/50 H	2-3420-3's IBM 145 IH2J Core

U.S.	Home Office	T.A. Takash	(602) 248-6037
	New York	Dick Ventola	(914) 949-1515
	Chicago	Pete Ahern	(312) 298-3910
	Dallas	M.W. "Bill" Tucker	(214) 233-1818
	San Francisco	Henry Paulson	(415) 283-8980
International	Canada	Don Maunder (Toronto)	(416) 366-1513
	U.K./Europe	Joe Gold (Geneva)	(022) 61-27-54
	Mexico	Andres Contreras	(905) 543-6850
	Austro-Asia	John Hallmark (Dallas)	(214) 233-1818
	Eurasia	Don Haworth (Dallas)	(214) 233-1818
Non-IBM	Dallas	John Hallmark	(214) 233-1818

Greyhound Computer Corporation Greyhound Tower Phoenix, Arizona 85077

FORSYTHE McARTHUR
Dealer & Lessor in IBM Computers
919 North Michigan Avenue
Chicago, Illinois 60611
(312) 943-3770
Member, Computer Dealers Assoc.

DATA GENERAL 840 COMPUTER
MMPU, PWR-FAIL, AUTO-RESTART, MUL/DIV, 40 KB MEMORY, IO CABLES INCLUDED FOR: PRINTER HS READER/PUNCH, 4057 DISC, TTY, QTY.
Available After Oct. 1
Call Tom Mosco
(603) 893-4552

DEC
BROKER IN NEW
&
USED DEC COMPUTER SYSTEMS
& COMPONENTS
FOR SALE
11/60-CPU, RP04, M8357, M7258, M7850, KG11A, DL11WB, BA11KE, VT52AA, DDS310, 324.
C.D. SMITH
730 N. Post Oak Rd. #301
Houston, TX 77024
(713) 686-9405

efm computer leasing, inc.
3000 marcus avenue
lake success, ny 11040
(516) 488-7876
LEASE • BUY • SELL
360/370 CPUs & PERIF.
FOR SALE • AVAILABLE NOW
CAL-COMP
2- 1144 CONTROLLERS
4- 244 DISK DRIVES

dataserv
buy • sell • lease • trade

370
115 and 125
Steve Lacny
800-328-2406
For Sale or Lease
Any 115/125 configuration
Sending 115/125
Back to IBM
Call us! We'll show you how to make money using your rental credits.

370
135 through 168
Dave Miller
616-637-8481
For Sale or Lease
135 - 145 - 155
CPUs — Peripherals — Memory
We'll Buy
Any 370 CPU
Wanted
Your 370 CPU for sublease

370
Peripherals
800-328-2406
For Sale or Lease
360/30 - 40 - 50 - 65s
CPU — Peripherals — Memory
We'll Buy
Any 360 CPU
IBM Peripheral
Non-IBM Perph/Memory

360
CPUs and Peripherals
Neal Johnson
800-328-2406
For Sale or Lease

3211/3811	3340/A2,B2
3272/3277	3410/3411
3330/3333	3420/3803

STOP! Before you send any of the above machines back to IBM call us. We'll show you how to make money.

Sys/3
CPUs and Peripherals
800-328-2406
For Sale or Lease
5406 - 5410 - 5412 - 5415
CPUs — Peripherals — Memory
We'll Buy
Your 5406/5410
5415 — Rental credit machines
Peripherals — Memory

Call Toll Free 800-328-2406
or 612-544-0335
Or write: Dataserv Equipment, Inc., 9901 Wayzata Blvd.
P.O. Box 9488, Minneapolis MN 55440

WANTED
NCR
299 - 399 - 499
270 - 775 - 152
BURROUGHS
L Series -
TC700 – TC 3500
B731-B1700
IBM
360-370; Syst 3 & 32 Peripherals
DEC
PDP 8 And 11 CPU's
Peripherals
IOA DATA CORP.
383 LAFAYETTE ST N.Y. 10003
212 673-9300

FOR SALE
Delivery Positions
IBM 370/138, 148, 158
ALL WITH ITC
MARCH-JULY 1978
THE INGERSOLL MILLING MACHINE CO.
Call George Hess
815-987-6121

360 / 20-D2
SALE OR LEASE
MCC
- 1403 Mod 2 Printer
- 2560 A01 MFCU
- 2 2311 Disk Drives
- 2415 Mod 2 Tape Drives

METROPLEX COMPUTER COMPANY, INC.
Suite 1208 Honeywell Bldg.
1111 W. Mockingbird Lane
Dallas, Texas 75247 TWX 910-861-4171
(214) 634-2750

USER OFFERS
Sycor Terminals
(8) SYCOR 340D mini-computers with order entry and national communications network software with (2) diskettes and (2) cassette drives
Model 3585 120 CPS Printer
Paid $18K - Sell $10K each
Available 9/77 - 1/78
John Snyder
World Carpets
404/278-8000

Before you buy or lease . . . take a second look
TW
BUY – SELL – LEASE
360/30 – 360/40 – 360/50 – 360/65
IBM PERIPHERALS

370/135	370/145	370/155	370/165
370/138	370/148	370/158	370/168

ANY CONFIGURATION
TW COMPUTER INDUSTRIES INC.
3570 American Drive • Atlanta, Georgia 30366
404/451-1895 • TWX 810/757-3654
CHICAGO – 312/298-5650
WASHINGTON – 703/525-3074
LOS ANGELES – 213/370-4844

buy sell swap | buy sell swap | buy sell swap | buy sell swap | buy sell swap

IBM PROCESSORS & PERIPHERALS

	IBM PROCESSORS	IBM PERIPHERALS
SELLING:	370/135 HG October 15 360/65, 2860-2, 2870-1 370/145 HO Now 370/155 JO2 Now	3330-1, 11 3333-1, 11 3420, 3, 5
BUYING:	370/168 370/158 370/165 145 IO2	3340 A02, B02 3830-2 3420-4, 6, 8
LEASING:	370/155 36 month lease 370/165 November 1 360/65 2 Meg Now	3330-1, 11 3420-3, 5, 7 3803-1, 2

The Logical Choice

COMDISCO

9701 W. Higgins Rd. Rosemont, Ill. 60018
(312) 698-3000

San Francisco 415/944-1111
Fort Worth 817/534-1774
Atlanta 404/256-5956
Minneapolis 612/854-8107
New York 201/568-9666

---

dc dc

dearborn swapeth: 155 for your 145

dearborn giveth: 3211/3811 Oct. 1, 1977

dearborn taketh: 3277-2 w/4630; 3284-2; 1445N1; 3340's; 3420's

Call Tom Millunchick or Jim Spalding: (312) 827-9200 or any dearborn office.

dc **dearborn** computer company | dealer-IBM computers systems software leasing

1460 renaissance dr., park ridge, ill. 60068 (chicago) 312/827-9200
toronto (416) 621-7060 • st louis (314) 727-7277 • houston (713) 965-0788

WANTED

145 I2 - IH2 IBM MEMORY

For September/October Delivery

Lou Skavienski
(315) 425-1900
Telex: 93-7435

CIS

CIS Corp.
600 Mony Plaza
Syracuse, N.Y. 13202

Bytes & Pieces

We are leasing!

360/65
370/135
370/145
370/155

Please contact: Linda Vaughn
(415) 983-0220

ITEL CORPORATION

NEW DEC HARDWARE
Immediate Availability

11T34-AA	64K Byte Syst.
RK05 J-AA	2.5M Byte Disk Drive
MM11-DP	32K Byte Core Memory
LP 11-VA	300 LPM Printer
11T35	64K Byte Parity
KL8-JA	Serial Interface

Ask About Our Special Terminal Prices
LA36VT52**LS120**LA180**

BROOKVALE ASSOC.
(516) 585-0800

O.A.C.
IBM 360/370
also
Unit Record Equip.
OLIVER-ALLEN CORP.
110 Hi Vista Rd.
Sausalito, CA 94965
(415) 332-6262
Member Computer Dealers Assoc.

BUY • SELL • LEASE • TRADE

SYSTEM/3 370/115 370/125

ECONOCOM

ECONOCOM
1255 LYNNFIELD ROAD
P. O. BOX 17825
MEMPHIS, TENNESSEE 38117
901-767-9130

MEMBER: COMPUTER DEALERS ASSOCIATION

Short or Long Term Leases From RANDOLPH

370/138
370/148
370/135
370/145

...and all other 370's from 115's ... to 168's. CPU's or full systems. Up to 8-year lease available.

CALL THE 370 HOTLINE

800-243-5307

WANTED:
3420 Tapes: MOD 3's, 5's, 7's
135/145 Subleases or purchase

800-243-5308

Randolph Computer Company
537 Steamboat Rd., Greenwich, CT 06830
(203) 661-4200

buy sell swap | buy sell swap | buy sell swap | buy sell swap | buy sell swap

IBM UNIT RECORD EQUIPMENT

024 077 085 402 514 552 026
082 087 403 519 557 029 083
088 407 523 602 056 084 089
408 548 604 029 129

We Buy Sell or Lease
360s 1400s 1440s

IBM COMPUTERS

2040 GF, I/O Set
5 Spindle Calcomp 2314
6-60KB Tape Drives/Sims
8-1440 Disc Systems at $4,000
16K 1460 Systems with 1403-3
2803-2 and 2401-6
1401 Disc Systems
360/30's & 40's
any configuration

Big Savings on certain items of Equipment

Call us for all your needs; we buy rent and sell all types of IBM unit record equipment. Over 12 years of serving commercial and government requirements. Contact ACS for proposal.

ACS 7126 Mullins
Houston TX 77036
(713) 666-2122
TWX 910-881-1526
EQUIPMENT CORP.

BUY SELL LEASE

SYSTEM/3

Models 8, 10, 15
1403, 5421, 5445
3741, 5496, 9610

COMPUTER BROKERS, INC.
P.O. BOX 28298
Memphis, Tn. 38128
Phone 901/372-2622

FOR SALE OR LEASE
- 1404 Model 2 Printer with 2972-5
- 2415 Model 5 Tape Drive
- 2415 Model 4 Tape Drive

write or call
METROPLEX COMPUTER COMPANY, INC.
Suite 1208 Honeywell Bldg.
1111 W. Mockingbird Lane
Dallas, Texas 75247 TWX 910-861-4171
(214) 634-2750

CMI BUY LINES

BUY-SELL-LEASE-TRADE

370/165 370/168
Call Bob Van Hellemont
(313) 642-8000

370/145-158
Call Ron Baker
(313) 642-8000

370/155
Call John Mills
(313) 642-8000

370
115/125/135
Call Pam Hoban
(313) 642-8000

360/30 360/40
360/50 360/65
Call Gary Smith
(313) 642-8000

360/20
1130
Call Jim Carleton
(313) 642-8000

1403's 2821's
2501's 1442's
1443's
If you rent any of the above and are sending back to IBM call me. I'll show you how to make money using your rental credits. We also buy owned equipment and sell all of these units.
Call Kathy Housey
(313) 642-8000

IN CANADA
IBM 360 370
System / 3
Buy-Sell-Lease
Call Don DuPuis
CMI Company
P.O. Box 893
Windsor, Ont.
N9A 6P2
(519) 258-8910

System/3
Model 15
Call Jerry Roberts
(313) 642-8000

3420/s 3803/s
3333's 3830's
3330's 3340's
Call Darryl Hastings
(313) 642-8000

3742's
3741's
5496's
Call Jerry Sharon
(313) 642-8000

3270 CRT's
Printers/Controllers
Call Jim Carleton
(313) 642-8000
129-029-059-026

CMI *The IBM Dealer*
Computer Marketers International
1500 N. Woodward Ave., Birmingham, Mich. 48011, (313) 642-8000
Member Computer Dealers Association

370/168
FOR LEASE
Available December
Call or Write:
TW COMPUTER INDUSTRIES INC
3570 American Drive • Atlanta, Georgia 30366
404/451-1895 • TWX 810/757-3654

BUY • SELL
TELETYPE
Models 32 • 33 • 43
Telex • TWX/DDD
BRPE'S
NATIONAL
TELETYPEWRITER CORP.
207 Newtown Rd.
Plainview, N.Y. 11803
(516) 293-0444

QUANTITY

1 I.B.M. 370/158K-Available 12 1977 - For Lease 1,2,3 & 4 Years

2 I.B.M. 3333-II-Available 11 1977 - For Lease 1, 2 & 3 Years

6 I.B.M. 3330-II - Available 11 1977 - For Lease 1, 2 & 3 Years

1 A.M.S. 145 Memory 3/4 Meg Available Immediately - For Lease 1, 2 & 3 Years

1 A.M.S. 224K 135 Memory Available Immediately - For Lease 1, 2 & 3 Years

3 Data 100 Terminals - Model 701, Model 76, Model 78 Available Immediately - Short term leases available

Call Terry Schadoff or Phil Norton (703) 821-8770, Federal Leasing, Inc., Suite 610, 1970 Chain Bridge Road, McLean, Virginia 22101.

FOR SALE/SUB-LEASE

IBM 370/148	Processor
3047	Power Unit
(3) 3286	66 CPS Printer
(2) 3203	Printer
2501	Card Reader
(2) 1416	interch Train Cartridge
3340	Disk Storage & Control
(2) 3344	Disk Storage Fixed Head
(4) 3348	Data Module
3411	Mag Tape Unit & Control
(2) 3410	Mag Tape Unit
3704	Communications Controller
3271	Remote Control Unit
(8) 3277	Display Station
3272	Local Control Unit
029	Card Punch

ALL EQUIPMENT IMMEDIATED AVAILABLE
IN UNUSED CONDITION
WRITE ON COMPANY LETTERHEAD
FOR FULL LIST OF FEATURES TO
CW BOX 3167
797 Washington St., Newton, Ma. 02160

We want to buy a Honeywell 1250 or 2200 or 3200 with a minimum of 128K, tape and disc system. We are a private user, not a broker. Please write, stating:

1. Exact Equipment by Type
2. Selling Price
3. Earliest Delivery

We will call or write every reply.

Thank You.

CW Box 3166
797 Washington St.
Newton, Mass. 02160

MINICOMPUTERS & SYSTEMS
Don't waste company time or money
Check with us before you buy or sell
Brand New Data General
Nova 2/10 - Save 40%
Jumbo 1200 - Save 30%
Nova 3/12 - Immed. Del.
New & Used Dec Equipment:
PDP 11/04 — Immed. Del.
RK 05 — Immed. Del.
Many others New & Used
Tape Systems for DG
from $3,900
WANTED
Minicomputer systems & peripherals.
Buyers waiting for many items:
MINICOMPUTER EXCHANGE
(408) 733-4400
TWX 910-339-9272

WANTED TO BUY

IBM 370/155
with or without DAT
Contact: Harry Blair
(713) 524-8249

THERE ARE MANY
ALTERNATIVES
TO THE IBM
138-148-158-168
LEASE PLANS
AND WE OFFER THEM ALL
We Also Lease All Other 370 Equipment.
Will Purchase Your On Order Position!!!
National Computer Rental
415 Madison Avenue
New York, New York 10017
Tel. No. (212)532-1500

buy sell swap | buy sell swap | buy sell swap | buy sell swap | buy sell swap

IPS 201-947-4200

FOR SALE OR LEASE

145-12
two available with ISC's in December

135HG & FE
with IPA, ISC available in Nov.

360 CPU's
40's & 50's available now

I/O Sets
1403's, 2821's, 2540's available immediately

155J-II
available now with or without DAT. ALso 3360's and model changes

3420-5's & 7's
with controllers available September

IBM MEMORY
155, 135, 50, & 40

158 ISC
available immediately

WE WANT TO BUY
158's any configuration
155's, 145's, 135's
3420's all models
360/65's, 50's, 40's
370 IBM Memory

IPS Computer Marketing Corp., 2460 Lemoine Avenue, Fort Lee, N.J. 07024

RCM

BUYING
SELLING
LEASING

360/40 370/145 370/135
360/50 370/158 370/155
360/65 370/168 370/165
TAPES / DISKS / CORE

Pioneer Computer Marketing
1165 Empire Central Place
Dallas, Texas 75247
214/630-6700

SELLING

PREVIOUSLY OWNED EQUIPMENT
N.C.R., BURROUGHS, OLIVETTI

N.C.R. 31, 32, 490, and 152-47 & 152-70 TELLER UNITS
N.C.R. 735/736 MAGNETIC TAPE ENCODERS & LINE PRINTERS
N.C.R. 299, 399, & 499 MINICOMPUTERS and CENTURY SYSTEMS

BURROUGHS "L" 3000 THRU 9000 SERIES & TC'S
(W/WO PERIPHERALS) also B-700 THRU B-4700 SYSTEMS
OLIVETTI "P" and "A" SERIES
WE ARE AUTHORIZED N.C.R. DEALERS OF
210 ECR'S, SYSTEMEDIA, & MICROGRAPHIC PRODUCTS

BUYING OR SELLING – CALL US FIRST!

KEY-EXIMPORT CORP.
256 LIVINGSTON ST. (P.O. BOX 129) NORTHVALE, N.J. 07647
TELE. N.J. (201) 767-3444 N.Y.C. (212) 736-7736
TELEX 135149 CABLE KEYEXIMP NORTHVALE NJ

BUYING

For Sale

Entrex 480 System 64K CPU, 4.8MB Disk, BSC Communications, 800 BPI Tape, 5 Data Terminals.

We can arrange financing.

Write or call
Charles E. Leckner

Chesapeake Physicians, P.A.

4940 Eastern Avenue
Baltimore, MD 21224

(301) 342-5700

360/50 SUB-LEASE

...looking for maximum computer power at minimum cost..?

360/50H AVAILABLE DECEMBER 1, 1977
3 selector channels, 256K, has been operating 24 Hr/ day, 6 days/week, for past year with very high reliability.
FAST I/O SET 2821-I Control Unit
2540 Card Reader Punch
1403-NI Printer
EXCELLENT LEASE TERMS
Optional time commitment 18-40 months,
Certified IBM maintenance acceptable,
Minimum financial red tape dealing with end user.
Lease Price:
360/50H $3,200
Fast I/O Set $1450
or highest bidder

Call Steve Fisher
703 825-6301

COMMUNICATIONS
CORPORATION OF AMERICA
1 DIRECT MARKETING PLAZA, BOSTON, VIRGINIA 22713

Mini Computers
Buy-Sell-Trade

For Sale
DEC CPU's
11/04 11/34 11/T04
11/05 11/35 11/45
11/T34-BA
DEC Disks
RK05 RF11-RS11
RP02 RX11BA
DEC CRT's
VT50HA VT05
VT52 VT20
DEC Memory
MM11L MM11DP
MS11JP
Misc. Modules
Hundreds Of Miscellaneous Modules & Cables Available
Call For Other Components In Stock

For Sale
DEC
11/04-DC
DEC TJU16-EA
Substantial Discounts

DATALEASE

700 North Valley Street Anaheim, CA 92801
(714) 533-3920 **TELEX 692439**

FOR SALE
UARCO FORMS BURSTER-MODEL 1746 WIDTH 33-1/4" LENGTH 27" to 49" HEIGHT 42" CAPACITY of 125 FORMS PER MINUTE. FORMS ACCOMODATION: WIDTH 3-3/4" to 20" LENGTH 2-5/6" to 14"
$1,000.00
The Louisiana Coca-Cola Bottling Co., Ltd.
P.O. Box 50400
New Orleans, LA 70150
Mr. Hebert
(504) 822-2400

WANTED

* 1403-N1 Printer (w/UCS)
* Core Upgrade for 360/40 128K to 256K (Any)
* IBM 2314 Disk w/Cntrl
* Paradyne "Pix" Equipment

COMPUTER TIME, INC.
4211 S.W. Frwy #106
Houston, Tx 77027
GENE 713-629-4400

INDEPENDENT
HONEYWELL 200
PARTS-PERIPHERALS
SYSTEMS INSTALLATION
REPAIR
REASONABLE PRICES

FOR SALE

2040-64K M7-32K M9
120-1250-All Types Tape Drives
Readers Printers Punches

We Buy and Sell Used Honeywell Series 200 Equipment.

INTEGRITY
SYSTEMS, INC.
4812 Interstate Dr.
Cincinnati, Ohio 45246
Call Wilson Grabill
(513) 874-8100

THIS SPACE COST $124.25 and could be working for you.
contact
Frank Collins
Mgr. Classified Adv.
COMPUTERWORLD
797 Washington St.
Newton, Ma. 02160
(617) 965-5800

SOFTWARE

---

call... **the Matchmakers**

BUYING•SELLING•LEASING•TRADING
1·800·654·9179
TOLL FREE!

CSI COMPUTER SALES INTERNATIONAL, INC.

RPG II SYSTEMS

*A/R-OPEN ITEM OR B/F
*ACCOUNTS PAYABLE
*GENERAL LEDGER
*PAYROLL AND LABOR DIST.
*INVENTORY
*CREDIT UNION' MAILING, ETC

Extensive Documentation Provided
Bancroft Computer Systems
P.O. Box 1533, Dept. C
West Monroe, LA. 71291
(318) 388-2236

software for sale	software for sale	software for sale	software for sale	time & services

TONE

TSO for VS1

Redesigned to eliminate TCAM and the staggering overhead of user swapping

ISP

System to System Communication for VS1

Intersystem Spool Processor

Two unique products from TONE Software Corp.

(write or phone for details)

TONE Software Corp.

(714) 636-8501
11588 Trask Avenue
Garden Grove, Ca 92643

SAVE

RPG/RPG II TO COBOL TRANSLATOR

This package accepts all types of RPG and produces ANS COBOL while approaching 100% error free conversion. The resulting COBOL program is modular in design and easy to read and maintain. Several client service options are available: Perpetual Lease, Conversion only, Clean Compile and full implementation including production JCL, test and installation. Over 100 satisfied customers.

For Prompt Reply Write or Call Us Today

DASD CORPORATION

Milwaukee, Wisconsin 53217, Suite 301,
8705 N. Port Washington Rd., (414) 351-2600

CI ANNOUNCES:

NEW PACKAGES FOR DATAPOINT SYSTEMS

HARDGOODS DISTRIBUTION SYSTEMS $2,895*

Includes:
- -Order Entry
- -Invoicing & Statements
- -Inventory
- -Accounts Receivable
- -Cash Receipts
- -Optional General Ledger

PAYROLL $895*

Both systems are written in DATASHARE and include source.

OTHER PACKAGES
G/L, A/R, Credit Union, Online Job Accounting

*Prices good through 10/31/77

CIMARRON INFORMATION SYSTEMS, INC.
P.O. Box 113, MS #3
Helotes, TX 78023
(512) 695-8081

WE ARE

BROKERS OF COMPUTER TIME

New York & New Jersey Only

Computer Reserves, Inc.
(212) 687-1840
(201) 676-1881

Datacenter 370/158

3 meg VS2
Specializing in
Remote Job Entry
and Batch

Excellent Technical Support
Very Attractive Rates

Contact: Stu Kerievsky
(212) 564-3030
Datamor
132 W. 31st St.
New York, N.Y. 10001

PDP 11 — RSX 11-M

We have a library of RSX11-M software available which includes:

HISAM
an Hierarchial Index Sequential Access Method functionally identical to GE Timesharings' HISAM

DH 11
drivers for Terminet 1200 and other types of terminals

and MORE ....

We also provide the full gamut of PDP 11 SOFTWARE services

SPIRIDELLIS & ASSOCIATES, INC.
(the big name in small computers)
(212) 221-7270 (201) 536-2165

HOSPITAL SOFTWARE PACKAGES

Installed and operational in major hospitals nationally. Written in ANSI-COBOL. Perpetual lease. IBM 360-370/OS/DOS, Burroughs, Honeywell, Univac, NCR. Fully documented with source code.

- Budget Performance
- General Ledger
- Cost Allocation
- Financial Statements
- Report Generator
- Accounts Payable
- Payroll
- Personnel Management
- Inventory Control
- Patient Billing/Accounts Receivable

HOSPITAL FINANCIAL SERVICES, INC.
170 Newport Center Drive
Suite 240
Newport Beach, Calif. 92660
(714) 759-0223

TIME & SERVICES

IBM 360/50

ALL SHIFTS 384K,
3-2401V, 14-2314, 1403-N1,
2540, 3 sel. ch.

VECTOR SYSTEMS CORP.
University City
Science Center
3624 Market St.
Philadelphia, PA 19104

Contact: LEO GENOVESE
(215) 387-6500

Supplies Inventory

MSA's Supplies Inventory System helps our clients control over 500 million items.

If you're looking for a system that tells you what to buy and when to buy it, generates purchase orders, reduces stockouts, and provides supplies usage and cost reports, call Marge Kimbrough at (404) 262-2376 or send us this coupon.

MSA

THE FINANCIAL SOFTWARE COMPANY

Management Science America, Inc.
3445 Peachtree Road, N.E.
Atlanta, Georgia 30326
(404) 262-2376

Chicago 312-986-2450;
Los Angeles 213-822-9766;
New York 201-871-4700

NAME
COMPANY
TITLE
ADDRESS
CITY
STATE ZIP
PHONE COMPUTER MODEL

I am interested in:
- ☐ Supplies Inventory Control and Purchasing
- ☐ General Ledger
- ☐ Personnel Management and Reporting
- ☐ Payroll Accounting
- ☐ Canadian Payroll Accounting
- ☐ ALLTAX™
- ☐ Accounts Receivable
- ☐ Accounts Payable
- ☐ Financial Information and Control
- ☐ Fixed Asset/Property Accounting

---

the choice of

Mass Merchandisers

ACCOUNTING IV GENERAL LEDGER

Our software products—General Ledger, Accounts Receivable, Accounts Payable and Standard Cost—are the choice of leaders like Mass Merchandisers ... *not by chance, but by design.* For details, call (213) 887-9121.

informatics inc

World's Largest in Software Products

21050 Vanowen St. Canoga Pk. CA 91304

ACCOUNTING SOFTWARE FOR DEC RSTS/E CTS-500 USERS

From one of the pioneers in commercial data processing using RSTS. Successful installations in manufacturing, distribution, service bureau uses. Completely on-line, interactive systems. If you are installing or have installed a RSTS/E or CTS-500 system, contact us first for cost-effective solutions in: ACCOUNTS PAYABLE; GENERAL LEDGER; FINANCIAL REPORTING

The design specifications for these packages were developed by accountants for use by accountants. All packages provide excellent audit-trail, extensive user prompting, fast data entry, full file-maintenance and inquiry capabilities, modular design and construction.
These are consolidating packages and support multi-division company and multi-company corporate accounting functions.
For more information, contact us at:

(219) 936-2183
p.o. Box 160
plymouth, in 46563
Div. of Young Door Co.

Plycom tm services

HOUSTON COMPUTER TIME

$29 per hour

IBM 360/40 128K
(5) 2314 (4) 2311 (5) Tapes
High Speed IO Set

GENE 629-4400

Los Angeles Time

IBM 360/40

All Shifts 128K
6-2406, 4-2314, 1403, 2540
off-line printer available

Torrance, CA
Call and ask for Bill
(213) 770-3400

REMOTE JOB ENTRY

PHOENIX-HECHT

- IBM 370/158-3
- Nationwide incoming Watts lines
- Complete systems and software support
- Full application Library (including all accounting applications)
- All high-level languages
- Prime time and off hours
- VS 2, HASP, INTERCOMM, DYL-260
- Complete data security including off-site storage

For information call Walter Czerniak at (312) 861-7100

PHOENIX-HECHT
233 N. Michigan Avenue
Chicago, Illinois 60601

TIMESHARING

PDP 11/45

RSTS/E V6B with RP06 Disk Drives
All Shifts and Weekends
Complete Data Security
Attractive Rates
Contact: W. Weintraub
Zipatone, Inc.
150 Fencl Lane
Hillside, Il. 60162
(312) 449-5500

SERVICE BUREAU SOFTWARE

GENERAL LEDGER

* Cash Register
* Journal Register
* General Ledger
* Trial Balance
* Balance Sheet
* Income Statement

Disk System Written in Low Level Cobol. Guaranteed. Total Price $295. or Send $5.00 for Complete Samples.

COMPUTER TIME, INC.
4211 S.W. Frwy # 106
Houston, TX 77027
Gene 713-629-4400

To meet (or beat) deadlines, to handle user requests, to stay within budget, use

PC-70

The automated system that helps you manage people and projects effectively, PC-70 is applicable to virtually any type of project or project-oriented group, including DP, engineering, R&D, legal, facilities planning, maintenance, and construction. Simple, powerful and economical, PC-70 is today's leading project/resource management system, with over 400 clients worldwide.

Atlantic Software Inc.

5th & Chestnut Sts.
Philadelphia, PA 19106 / (215) 922-7500
Europe: Tecsi Software, Paris / 225-86-83

OEM Demonstrator System FOR SALE

Hewlett Packard
3000 Series
II MOD 6

New equipment tax credit HP performed installation and warranty — application software also available.

CMC ASSOCIATES
755 Boylston St.
Boston, MA 02116
(617) 266-4933

Whether you're buying, selling, swapping, hiring or looking, Computerworld's Classifieds work.

Issue Date: Ad closing is every Friday, 10 days prior to issue date.

Sections: Please be sure to specify the section you want: Time and Services, Software for Sale, Position Announcements and Buy/Sell/Swap. (Available upon request: Software Wanted, Turnkey Systems and Real Estate.)

Copy: We'll typeset your ad at no extra charge. Please attach CLEAN typewritten copy.

Cost: Our rates are $49.70 per column inch. Minimum size is two column inches and costs $99.40 per insertion. Extra space is available in half-inch increments and costs $24.85. Box numbers are $3.00 extra.

Billing: If you're a first-time advertiser, we must have your payment in advance.

Ad Size: _____ Issue (Date(s): _____ Section: _____

Signature _____

Name: _____

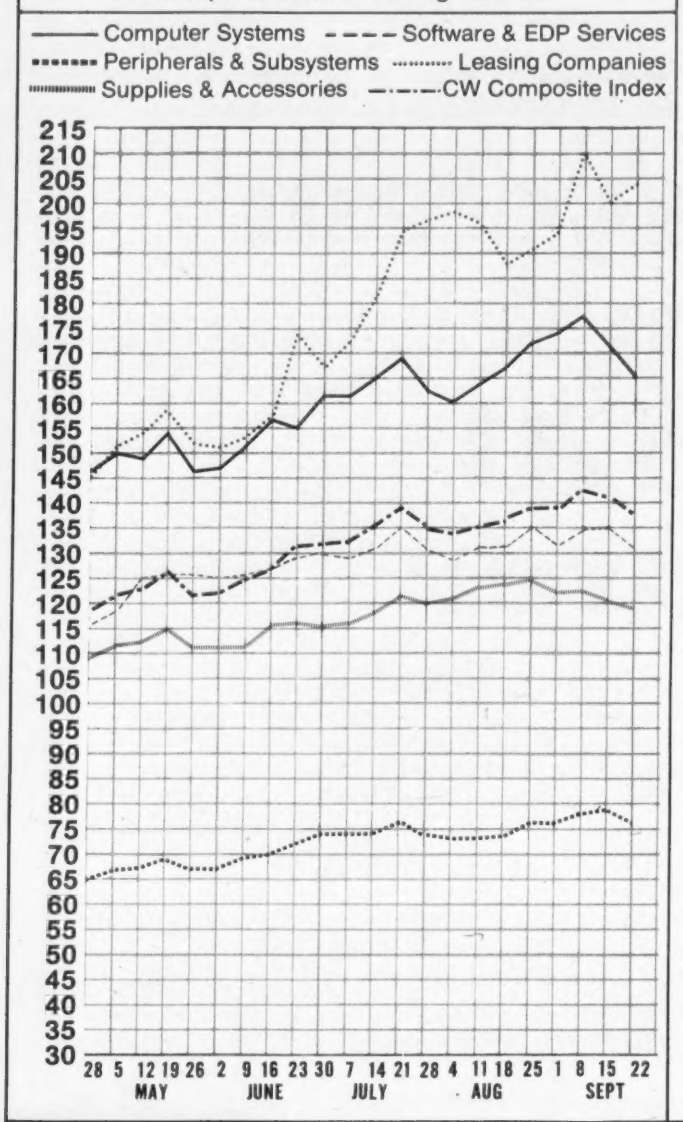
Company: _____ Title: _____

Address: _____ Tel: _____

Send this form to: Kathy Steinberg, Position Announcements or Frank Collins, Classified Advertising

COMPUTERWORLD, 797 Washington St., Newton, Mass. 02160

COMPUTERWORLD
Computer Stocks Trading Indexes



Earnings Reports

IBM
Three Months Ended June 30

	1977 (000)	1976 (000)
Shr Ernd	$4.44	$3.94
Revenue	4,419,070	4,013,514
Earnings	658,329	592,808
6 Mo Shr	8.26	7.57
Revenue	8,509,365	7,828,331
Earnings	1,231,673	1,137,193

GRAHAM MAGNETICS
Year Ended June 30

	1977	1976
Shr Ernd	$1.18	$1.22
Revenue	18,438,455	16,499,705
Earnings	1,116,960	1,145,535
3 Mo Shr	.32	.42
Revenue	4,489,978	4,385,693
Earnings	305,609	394,971

GRAPHIC CONTROLS
Three Months Ended June 30

	1977	1976
Shr Ernd	$.76	$.82
Revenue	17,034,000	14,393,000
aEarnings	975,000	1,037,000
6 Mo Shr	1.24	1.39
Revenue	33,821,000	29,243,000
aEarnings	1,578,000	1,753,000

a-Includes gains from sale of investments of $98,000 in the quarter and six months of 1977, compared with $341,000 and $362,000, respectively, in 1976.

INSTRUMENT SYSTEMS
Three Months Ended June 30

	1977	1976
Shr Ernd	$.01	.....
Revenue	42,685,000	39,947,000
Disc Op Loss	.....	766,000
Earnings	210,000	(4,226,000)
9 Mo Rev	116,878,000	105,186,000
Disc Op Loss	.....	1,974,000
Loss	14,088,000	8,981,000

HAZELTINE
Three Months Ended June 30

	1977	1976
Shr Ernd	$.41	$2.05
Revenue	22,869,000	23,848,000
Tax Cred	.....	770,000
Earnings	830,000	4,125,000
6 Mo Shr	.78	2.45
Revenue	45,701,000	44,772,000
Tax Cred	.....	1,050,000
Earnings	1,580,000	4,905,000

Computerworld Sales Offices

Vice-President/Marketing
Roy Einreinhofer
Advertising Administrator
Terry Williams
COMPUTERWORLD
797 Washington Street
Newton, Mass. 02160
Phone: (617) 965-5800
Telex: USA-92-2529

Boston
Robert Ziegel
Northern Regional Manager
Mike Burman
Account Manager
COMPUTERWORLD
797 Washington Street
Newton, Mass. 02160
Phone: (617) 965-5800

New York
Donald E. Fagan
Eastern Regional Manager
Frank Gallo
Account Manager
COMPUTERWORLD
2125 Center Avenue
Fort Lee, N.J. 07024
Phone: (201) 461-2575

San Francisco
Bill Healey
Western Regional Manager
Jim Richardson
Account Manager
Donna Dezelan
Account Coordinator
COMPUTERWORLD
1212 Hearst Building
San Francisco, Calif. 94103
Phone: (415) 495-0990

Los Angeles
Bill Healey
Western Regional Manager
Jim Richardson
Account Manager
Judy Milford
Account Coordinator
COMPUTERWORLD
1434 Westwood Boulevard
Los Angeles, Calif. 90024
Phone: (213) 475-8486

Japan
Mr. Shigema Takahashi
General Manager
DEMPA/COMPUTERWORLD
1-11-15 Higashi Gotanda
Shinagawa-ku, Tokyo 141
Japan
Phone: (03) 445-6101
Telex: J2424461

United Kingdom
Tony Vickers
COMPUTERWORLD
PUBLISHING LTD.
140-146 Camden Street
London NW1 9PF
England
Phone: (01) 485-2248
Telex: UK-26-47-37

West Germany
Hans-Jurgen Ballnath
COMPUTERWORLD GmbH
8000 Munich 40
Tristanstrasse 11
West Germany
Phone: (089) 36-40-36
Telex: W.Ger-5-215250-HKFD

TRADE*QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, SEPTEMBER 21, 1977

All statistics compiled, computed and formatted by TRADE QUOTES, INC. Cambridge, Mass. 02139

EXCH		1977 RANGE (1)	CLOSE SEP 21 1977	WEEK NET CHNGE	WEEK PCT CHNGE
	COMPUTER SYSTEMS				
O	AMDAHL CORP	22- 44	38	-2	-5.0
N	BURROUGHS CORP	55- 91	67 3/8	-2 3/8	-3.4
O	COMPUTER AUTOMATION	18- 30	23 1/2	-3 3/4	-13.7
N	CONTROL DATA CORP	20- 26	19 1/2	-1	-4.8
O	CRAY RESEARCH INC	15- 29	24 1/2	-1 1/2	-5.7
N	DATA GENERAL CORP	35- 51	46 1/4	-1	-2.1
N	DATAPOINT CORP	18- 32	29 1/2	-1 3/8	-4.4
N	DIGITAL EQUIPMENT	37- 53	45 1/8	-1 1/4	-2.6
N	ELECTRONIC ASSOC.	2- 3	1 7/8	0	0.0
A	ELECTRONIC ENGINEER.	8- 11	11	+1 1/4	+12.8
O	FOUR-PHASE SYSTEMS	13- 19	16 7/8	-1 1/2	-8.1
N	FOXBORO	42- 54	44	-2	-4.3
O	GENERAL AUTOMATION	6- 9	6 1/8	-1	-14.0
O	GRI COMPUTER CORP	1- 1	1/2	0	0.0
N	HEWLETT-PACKARD CO	69- 87	76 3/4	-1 3/4	-2.2
N	HONEYWELL INC	44- 55	44 1/2	-2 1/8	-4.5
N	IBM	245-286	256 1/4	-6 7/8	-2.6
O	MANAGEMENT ASSIST	5- 9	7 1/2	+ 1/2	+7.1
O	MEMOREX	23- 34	30 1/2	- 3/4	-2.3
O	MICRODATA CORP	7- 18	11 3/4	-1 5/8	-12.1
O	MODULAR COMPUTER SYS	5- 8	6 1/8	- 3/4	-10.9
N	NCR	32- 47	44 1/8	- 7/8	-1.9
O	PRIME COMPUTER INC	12- 23	17 3/4	-4 1/8	-18.8
N	PERKIN-ELMER	17- 22	19 1/2	- 1/2	-2.5
N	RAYTHEON CO	16- 33	29 3/4	-1 1/4	-4.0
N	SPERRY RAND	34- 42	33 1/2	-1	-2.8
O	SYCOR INC	8- 15	12 1/4	+ 5/8	+5.3
A	SYSTEMS ENG. LABS	5- 8	6 5/8	- 1/8	-1.8
A	WANG LABS.	10- 14	12 3/8	-1	-7.4
	LEASING COMPANIES				
O	ALANTHUS CORP	3- 5	5	+ 1/2	+11.1
O	BOOTHE COURIER CORP	8- 10	10 1/4	- 1/2	-4.6
O	COMDISCO INC	10- 13	12 3/4	+ 3/4	+6.2
A	COMMERCE GROUP CORP	1- 3	1 1/4	0	0.0
A	COMPUTER INVSTRS GRP	1- 2	1 1/8	+ 1/8	+12.5
M	DATRONIC RENTAL	0- 2	1 1/8	+ 1/8	+12.5
A	DCL INC	1- 2	2	- 1/8	-5.8
N	DPF INC	6- 9	9	0	0.0
N	ITEL	13- 22	19 7/8	- 1/4	-1.2
N	LEASCO CORP	19- 27	22 5/8	- 7/8	-3.7
O	LEASPAC CORP	1- 2	1 3/4	0	0.0
O	NRG INC	1- 1	1/8	0	0.0
A	PIONEER TFX CORP	5- 11	5 5/8	+ 1/8	+2.2
N	U.S. LEASING	10- 15	13 1/8	- 7/8	-6.2

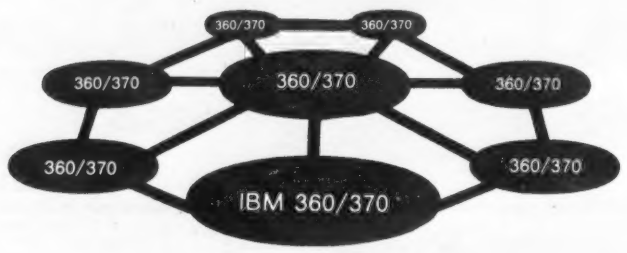
EXCH		1977 RANGE (1)	CLOSE SEP 21 1977	WEEK NET CHNGE	WEEK PCT CHNGE
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- 2	7/8	0	0.0
O	ANACOMP INC	7- 10	8 1/4	- 1/8	-1.4
A	APPLIED DATA RES.	5- 10	7 3/8	- 1/4	-3.2
N	AUTOMATIC DATA PROC	23- 30	25 1/4	- 1/2	-1.9
O	COLEMAN AMERICAN COS	2- 2	2 1/8	0	0.0
O	COMPU-SERV NETWORK	10- 15	12 1/2	+ 1/2	+4.1
O	COMP ELECTION SYSTMS	6- 10	9	0	0.0
O	COMPUTER HORIZONS	1- 1	1 1/4	0	0.0
O	COMPUTER NETWORK	6- 10	9 3/4	+ 3/4	+8.3
N	COMPUTER SCIENCES	7- 9	8	- 7/8	-9.8
O	COMPUTER TASK GROUP	1- 2	2	0	0.0
O	COMPUTER USAGE	1- 3	1 3/8	+ 1/8	+10.0
O	COMSHARE	5- 8	7 1/4	+ 1/4	+3.5
O	DATA DIMENSIONS INC	3- 5	3 3/8	0	0.0
O	DATATAB	1- 2	1 1/2	0	0.0
N	ELECTRONIC DATA SYS.	16- 20	17	- 1/8	-0.7
O	INSYTE CORP	2- 3	1 5/8	0	0.0
O	IPS COMPUTER MARKET.	1- 2	1 5/8	0	0.0
O	KEANE ASSOCIATES	3- 4	4	0	0.0
O	KEYDATA CORP	2- 3	2	- 3/8	-15.7
A	LOGICON	7- 17	12 1/4	- 1/4	-2.0
A	MANAGEMENT DATA	1- 2	1 1/2	- 1/2	-25.0
A	NATIONAL GSS INC	19- 26	24	0	0.0
O	NATIONAL DATA CORP	4- 7	6 1/2	- 1/4	-3.7
A	ON LINE SYSTEMS INC	16- 22	16 1/4	- 1/4	-1.5
N	PLANNING RESEARCH	3- 6	5	- 1/8	-2.4
O	PROGRAMMING & SYS	1- 1	1/4	- 1/8	-33.3
O	RAPIDATA INC	2- 3	2 1/2	- 1/8	-4.7
O	REYNOLDS & REYNOLD	17- 20	18 3/4	- 3/4	-3.8
O	SCIENTIFIC COMPUTERS	1- 4	4 1/2	+ 1/8	+2.8
O	TYMSHARE INC	14- 23	20	- 1/4	-1.2
A	URS SYSTEMS	4- 5	4 1/4	- 1/8	-2.8
N	WYLY CORP	1- 2	3/4	-	-7.0
	PERIPHERALS & SUBSYSTEMS				
N	ADDRESSOGRAPH-MULT	10- 15	13 5/8	+ 3/8	+2.8
O	ADVANCED MEMORY SYS	7- 9	7 1/8	- 1/4	-3.3
N	AMPEX CORP	8- 11	10	- 3/8	-3.6
O	ANDERSON JACOBSON	3- 5	3 1/2	0	0.0
N	APPLIED DIG DATA SYS	10- 20	14 1/4	-3 1/8	-17.9
O	BEEHIVE INT'L	8- 12	9 1/2	- 1/4	-2.5
A	BOLT,BERANEK & NEW	7- 9	8 3/4	+1 1/4	+16.6
N	BUNKER-RAMO	8- 12	10 3/4	- 1/4	-2.2
A	CALCOMP	3- 5	3 1/8	+ 1/8	+4.1
O	CAMBRIDGE MEMORIES	1- 4	3 7/8	- 1/8	-3.1
N	CENTRONICS DATA COMP	22- 30	27 3/4	- 7/8	-3.0
O	COGNITRONICS	1- 1	5/8	0	0.0
O	COMPUTER COMMUN.	5- 8	6 7/8	- 3/4	-9.8
O	COMPUTER CONSOLES	4- 7	4 1/4	+ 1/8	+3.0
A	COMPUTER EQUIPMENT.	2- 3	3	0	0.0
O	COMPUTER TRANSCEIVER	1- 1	1 3/8	0	0.0
O	COMTEN	9- 13	10 1/8	- 1/8	-1.2
N	CONRAC CORP	19- 28	21 1/2	- 1/2	-2.2

EXCH		1977 RANGE (1)	CLOSE SEP 21 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	DATA ACCESS SYSTEMS	4- 5	3 3/4	0	0.0
O	DATA 100	6- 9	7 5/8	- 1/2	-6.1
A	DATA PRODUCTS CORP	9- 16	14 1/2	- 1/2	-3.3
O	DATA TECHNOLOGY	3- 4	4 1/4	0	0.0
O	DATUM INC	1- 2	2 1/8	+ 1/8	+6.2
O	DECISION DATA COMPUT	2- 3	2 1/4	- 1/4	-10.0
O	DELTA DATA SYSTEMS	1- 1	3/8	0	0.0
A	DOCUMATION INC	6- 9	7 1/8	+ 1/8	+1.7
O	DATARAM CORP	2- 8	7 1/2	- 1/4	-3.2
N	ELECTRONIC M & M	4- 5	3 3/4	- 1/8	-3.2
O	FABRI-TEK	1- 2	1 1/8	+	+5.5
O	GENERAL COMPUTER SYS	0- 2	1 1/4	0	0.0
N	HAZELTINE CORP	9- 12	8 1/2	- 1/4	-2.8
N	HARRIS CORP	28- 39	36 1/4	+ 1/4	+0.6
A	INCOTERM CORP	10- 15	11 1/2	- 1/2	-4.1
O	INFOREX INC	4- 7	4 3/8	0	0.0
O	INFORMATION INTL INC	9- 14	10 1/4	- 3/4	-6.8
O	INTEL CORP	38- 57	45 1/2	0	0.0
A	LUNDY ELECTRONICS	3- 6	3 3/4	- 1/4	-6.2
O	MSI DATA CORP	6- 12	11 1/4	+ 1/8	+1.1
N	MOHAWK DATA SCI	5- 8	5 1/2	- 5/8	-10.2
O	PENRIL CORP	2- 5	4	+ 1/8	+3.2
A	PERTEC CORP	7- 9	7 7/8	-1 1/4	-13.6
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	PRECISION INST.	2- 2	1 1/2	0	0.0
O	QUANTOR CORP	4- 5	3 5/8	+ 1/8	+3.5
O	RECOGNITION EQUIP	6- 10	8	- 3/8	-4.4
O	SCAN DATA	1- 2	1 1/8	- 1/8	-13.6
O	STORAGE TECHNOLOGY	10- 17	16 7/8	+1 1/2	+9.7
O	T BAR INC	7- 13	12 3/4	- 1/8	-0.9
O	TALLY CORP.	4- 6	4 1/8	- 1/2	-10.8
A	TEC INC	7- 10	7 1/2	0	0.0
N	TEKTRONIX INC	29- 38	36	-1 1/2	-4.0
N	TELEX	2- 3	2 3/4	+ 1/8	+4.7
O	WILTEK INC	1- 1	5/8	- 1/8	-16.6
	SUPPLIES & ACCESSORIES				
A	AMERICAN BUS PRODS	6- 8	6 3/8	0	0.0
O	BALTIMORE BUS FORMS	2- 4	1 5/8	0	0.0
A	BARRY WRIGHT	10- 14	12 5/8	- 1/4	-1.9
O	CYBERNATICS INC	1- 1	7/8	- 1/8	-12.5
O	DUPLEX PRODUCTS INC	14- 19	17 5/8	+ 3/8	+2.1
N	ENNIS BUS. FORMS	6- 7	6 1/8	+ 1/4	+4.2
O	GRAHAM MAGNETICS	11- 17	17	+ 3/8	+2.2
O	GRAPHIC CONTROLS	14- 18	14 1/4	-1 1/4	-8.0
N	3M COMPANY	48- 56	50 1/8	- 7/8	-1.7
O	MOORE CORP LTD	26- 37	26 3/4	- 3/4	-2.7
N	NASHUA CORP	16- 28	26 3/4	+1	+3.8
O	STANDARD REGISTER	18- 25	20	0	0.0
O	TAB PRODUCTS CO	13- 19	15 3/4	- 1/4	-1.5
N	UARCO	19- 22	19 1/2	+ 1/8	+0.6
A	WABASH MAGNETICS	10- 15	11 7/8	- 3/4	-5.9
N	WALLACE BUS FORMS	17- 21	18	0	0.0

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

Meet FLEXICOM, the only distributed processing system based on IBM 360/370 architecture.

Flexicom is an entirely new approach to building multi-processor networks. Flexicom is the only distributed processing system that uses IBM's 360/370 architecture at *every* location in the network.



This consistent architecture means more flexibility, more power, and much simpler application design. The confusion of linking minicomputer "satellites" to a general-purpose mainframe "host" is gone. Each Flexicom site can run the same applications, use the same database management system, and access the full range of IBM 360/370 software.

Flexicom systems come in a variety of sizes and speeds. They range from small remote satellites to powerful front-ends.

Each Flexicom system is a complete hardware/software package. Each system combines an IBM mainframe with proven software, peripheral devices, and complete transmission control facilities. In addition each member of the Flexicom family is interchangeable with any other, giving you almost unlimited flexibility in network planning.

For Front-Ending

When locally-attached to the host, a Flexicom system provides all of the advantages of a front-end processor—without the need for specialized hardware and software.

A Flexicom front-end will relieve your main computer of all line control, error recovery, queuing, and message switching overhead. Flexicom even supports a complete administrative message switching system that can be selectively or completely independent of the host. Best of all, a Flexicom front-end can off-load all message editing and formatting logic—sometimes more than half the transaction processing load—with little or no user programming.

Your existing staff can write programs for a Flexicom front-end using high-level languages such as COBOL, FORTRAN, and PL/I. This allows you to access your existing database to edit and process messages both before and after they are sent to the host, further reducing the host workload.

For Distributed Processing

When remote from the host, a Flexicom system provides many of the off-loading advantages of a front-end while also functioning as a powerful distributed processor. This means complete support for its own network of terminals, selective access to the host, truly distributed databases using identical host and satellite file structures, plus local batch processing on a full-feature CPU.

As with a Flexicom front-end, developing new applications is simple and straightforward. On-line programs can be written in high-level languages, message editing and formatting logic can be developed interactively at a terminal, and a complete on-line data entry system can be implemented without user programming.

A True Turnkey System

Flexicom is delivered with everything you need: prepackaged software, CPU, peripheral and transmission control hardware, complete installation services and full documentation. Trained Customer Service Representatives will provide on-site education in the use of Flexicom and will also show your staff how to integrate Flexicom into your existing CICS, IMS, or other telecommunication system.

Interested?

We'll be glad to send you a Flexicom brochure or enroll you in a free Flexicom seminar in your area. Just return the coupon or give us a call.

---

turnkey systems inc.
111 east avenue
norwalk, connecticut 06851
(203) 853-2884/telex 064351

839 mitten road
burlingame, california 94010
(415) 697-1833

tsi international, ltd.
19 bedford row
london WC1R 4EB, england
01-405-7304/telex 23302

additional
representation
worldwide

☐ Send more information.
☐ I'd like to attend a Flexicom seminar.
☐ Have a Flexicom Representative call. Phone_____

Name_____ Title _____

Company _____

Address _____

City_____ State_____ Zip _____